

Fostering Community Among Women Mountain Bikers

**Designing Digital and Physical Experiences
for an Extreme Sport**

Samantha Wischmeyer

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for an Extreme Sport

Samantha Wischmeyer

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Alison Place, M.F.A.
Committee Chair

Ryan Slone, M.F.A.
Committee Member

Nadia Issa, Ph.D.
Committee Member

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Abstract

Although women have shown growing interest in mountain biking in recent years, a disproportionate number of men and women participate, with women representing only one-third of overall riders (The National Sporting Goods Association, 2023). Many women describe feeling insecure and intimidated by what they perceive to be the traditional mountain biking culture (Bordelon & Ferreira, 2019; Carpiet, 2014; Huybers-Withers, 2015; McCormack, 2020; Nash & Moore, 2021). This research is concerned with fostering a sense of belonging and opportunities for community-building to reduce barriers of entry in mountain biking for self-identified women in Northwest Arkansas. Northwest Arkansas has a highly active cycling community and a well-connected trail system, making it an ideal location to study community-building activities in mountain biking.

Extreme sports such as mountain biking have great potential to build connections amongst participants (McCormack, 2017). However, when these sports are exclusive, they prevent women from experiencing the proven social, mental, and physical health benefits that mountain biking can provide. Using a mixed-methods research approach and a feminist systems investigative framework, this research demonstrates that design has the potential to bridge the gap between digital and physical spaces to support community-building (Davis, 2018). Data collected are used to inform the design of a digital app and an in-person workshop, which collectively aim to increase participation and camaraderie for women in Northwest Arkansas who are interested in or are already mountain biking through virtual interactions that support agency and forming relationships, as well as in-person interactions that facilitate knowledge-sharing and community-building.

Keywords: mountain biking, women, community, belonging, barrier of entry

I.

Context

“**[Extreme sports]** are an important site not only for play but also for **community formation**. When these spaces are unwelcoming, it prevents people from experiencing the deep connection and freedom that can come from **sharing the experiences** of nature, risk, challenging fears, and physical boundaries” (McCormack, 2020, p. 123).

Area of Investigation

Mountain biking has grown in popularity in the U.S. in the past decade, with an estimated 6.4 million riders in 2022 alone: a 1.2 million participant increase since 2013 (National Sporting Goods Association, 2023). Mountain biking has been a historically male-dominated sport since its inception in the 1980s on the Western coasts of the U.S. and Canada (McCormack, 2017). Though there has been growing interest in mountain biking among women in the last few years, the sport is dominated by men, with 67% male riders and 33% female riders¹ (McCormack, 2017; National Sporting Goods Association, 2023).

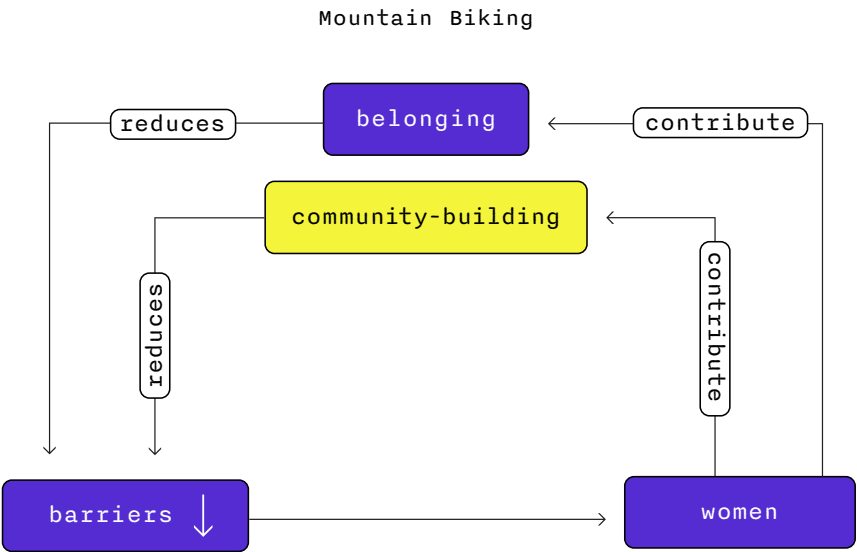
This research investigates how a sense of belonging and opportunities for community-building reduce barriers to entry in mountain biking for self-identified women. I hypothesize that more women are interested in the sport than are currently on the trails. Through investigation of what keeps women from riding and how communities are formed, this research aims to lower barriers of entry and empower more women riders.

Northwest Arkansas (NWA) is the ideal setting to research the self-identified women mountain biking community due to its world-class trail systems and community engagement. The region has over 300 miles of well-maintained off-road trails, a highly active cycling community, and numerous organizations related to cycling activism. However, mountain biking is a sport with many barriers to entry, including, but not limited to, the physical demands, the culture that skews white and male, the psychological or “fear” factors and the cost and time constraints. Mountain biking requires physical prowess; it is a demanding and challenging activity. However, the sport has a growing community of body-inclusive and adaptive riders. Mountain biking can be an intimidating and frightening sport, and the presence of so few women makes them more visible and open to scrutiny.

¹ Non-binary riders were not included in this study.

Building communities through mountain biking is one main element that fosters belonging in the sport. Creating spaces of belonging is essential to the relationship between mountain biking and women’s barriers to participation (McCormack, 2017). Figure 1 displays the relationship between belonging and community-building. Belonging reduces barriers for women, who in turn contribute to a sense of belonging for future women participants. As seen on the chart, community-building works in tandem with those efforts. Community-building reduces barriers for women, who in turn contribute in the future. Belonging and community-building work to create a feedback loop of engagement and participation for a community, in this case, mountain biking.

Figure 1
A feminist community-building framework



Justification

Women mountain biking communities are an under-researched topic in academia. There is no scholarly research on the percentage of women and non-binary mountain bikers compared to men. Additionally, academic studies have under-researched and, at times, blatantly excluded women’s mountain biking experience and women’s mountain biking products. One example includes a content analysis on market segmentation in mountain biking in which women’s bikes were removed from the study altogether, implying that women are not a part of the market (McEwan & West, 2017). The only demographic data collected about mountain biking in the U.S. is from industry reports, for instance, the Outdoor Participation Trends Report and the Sports Participation in the U.S. Report, leading to insufficient data on the precise demographics of mountain biking and the experience of participating individuals. Additionally, these complete reports exist behind a paywall, making them difficult and expensive to access.

There are numerous benefits of mountain biking that women are excluded from due to the lack of data regarding their experience. Mountain biking has many potential benefits for participants and communities that engage in the activity, including physical, mental, and social well-being improvements (Jebaraj, 2023; McCormack, 2017; Roberts et al., 2017). As Nash and Moore write, “Regular physical activity plays a critical role in the prevention and management of many common, chronic and costly conditions including cardiovascular disease, type 2 diabetes, certain cancers, obesity, musculoskeletal conditions, and depression and anxiety” (2021, p. 454). Mountain biking provides excellent physical and mental benefits, and the cycling economy creates a substantial fiscal impact in Northwest Arkansas. In NWA alone, cycling generates a \$159 million impact and supports an estimated 743 jobs in the area (Jebaraj, 2023).

In addition to the excellent health perks, mountain biking offers benefits for communities. Figure 2 outlines Robert Putnam’s social capital theory framework to describe why

community building is valuable. Community members build social capital through norms of reciprocity, such as the Golden Rule of treating others as one would want to be treated (Putnam, 2020). Cultivating social capital builds active and well-connected communities, which benefit those taking part but also those not directly involved, known as *bystanders* (Putnam, 2020). Based on the social capital theory framework, cultivating social capital among women mountain bikers is valuable in developing a community among this sub-group.

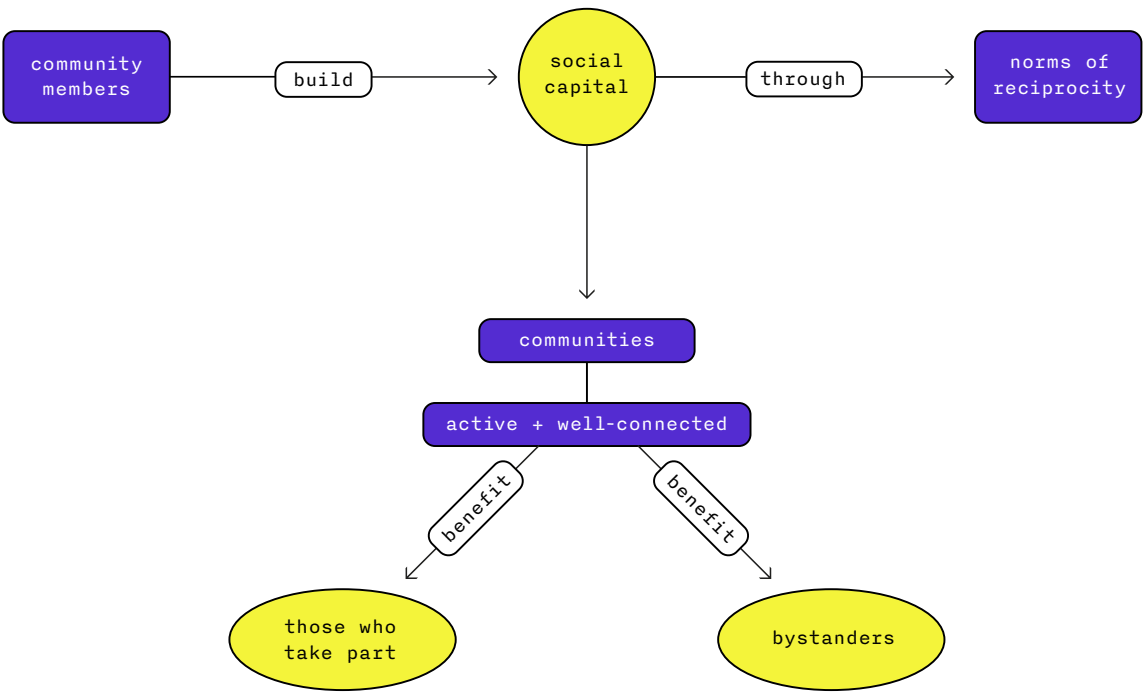
Expanded research on outdoor activities is vital due to the growing population of active Americans. Over 168 million Americans participated in outdoor recreation as of 2022, a historic high (Outdoor Industry Association, 2023). Additionally, 108 million Americans reported bike riding in the past year, a staggering 34% of the U.S. population (Corona Insights, 2023). Lastly, as previously mentioned, mountain biking has had a substantial participant increase in the last decade (National Sporting Goods Association, 2023). Since a significant number of Americans are getting outside, cycling, and mountain biking, there is a need for more specific research about the individual participant experiences to ensure each feels a sense of belonging during their activity.

There is a solid foundation for mountain bike research in sociology, sports psychology, and kinesiology (Bordelon & Ferreira, 2019; Huybers-Withers, 2015; Huybers-Withers & Livingston, 2010; McCormack, 2017; McCormack, 2020; McEwan & Weston, 2017; Roberts et al., 2018; Wheaton, 2010). This research expands upon social and sports sciences studies with a design research lens, adding to the knowledge of feminist community-building practices.

Audience

The audience for this research is self-identified women over the age of 18 who live in Northwest Arkansas and are either interested in mountain biking or currently mountain biking.

Figure 2
Social capital theory diagram



Note. This framework was adapted from *Bowling alone: The collapse and revival of American community* (Rev and updated ed.), by R. Putnam, 2020, Simon & Schuster Paperbacks. Designed by Samantha Wischmeyer, 2024.

Key Terms

Mountain biking *Mountain biking* is a type of cycling performed on a natural surface or off-road trail. The main types of mountain biking are downhill, free-ride, cross-country, and trail riding, each with varying degrees of risk and difficulty (McCormack, 2020). Research and literature have labeled mountain biking as a lifestyle sport, an action sport, an alternative sport, and an extreme sport, to name a few (McCormack, 2020; Roberts et al., 2018; Wheaton, 2010). I agree with Roberts and define mountain biking as an extreme sport since there is a high risk of injury and even morbidity in all levels and types of mountain biking (Roberts et al., 2018).

Self-identified woman A *self-identified woman* is a person who most strongly aligns their gender identity as a woman; it is not a distinction based on sex. Caroline Criado Perez defines *gender* as “the social meanings we impose upon those biological facts – the way women are treated because they are perceived to be female” (2019, p. xvii). The audience for this research includes anyone who identifies their gender as a woman.

Community of practice A *community of practice* is “[a group] of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner & Wenger-Trayner, 2015, p. 2). In the scope of this research, the women’s mountain biking community of Northwest Arkansas is a community of practice, as they share a love of mountain biking and meet regularly to participate in the sport together. These individuals and groups benefit from the shared experience of making and doing together.

Barrier of entry A *barrier of entry* is an economic term initially coined by Joe S. Bain in 1956. It refers to an economic advantage of established sellers over incumbent sellers in a capitalist market (McAfee et al., 2004). However, in the scope of this research, a barrier of entry is anything preventing a person from entering a space. A barrier of entry can be economic, social, psychological, cultural, or physical.

Empowerment *Empowerment* is “the power to define your own life choices and pursue your own goals” (Mustafa, 2023, pp. 53-54). Empowerment is a process of plurality, alternatives to the dominant narrative, grace, and freedom of choice (Mustafa, 2023). People can use mountain biking as a tool of empowerment: it requires creative problem-solving, courage, and humility.

Limitations

The participants for this research are limited to self-identifying women 18 and over who live in Northwest Arkansas and are either currently mountain biking or are interested in starting mountain biking. I limited the audience to self-identified women to avoid the fallacy that what will apply to women will apply to non-binary and trans people. Additionally, there is no assumption that what applies to women in the Upper South will apply to women in the rest of the country. I studied the women’s mountain biking community I am a part of and, therefore, gathered more accurate data and insight.

Time constraints were a significant limitation in this research, as the timeline was under six months. Time constraints limited the potential pool of participants and the scope of the research. Additionally, time constraints further limited participation since interviews occurred within a block of around a month. Limitations to the scope of this research included only studying the sport of mountain biking and focusing on the concept of community within the mountain biking subculture.

Assumptions

An assumption for this research is that there are self-identified women who are interested in mountain biking but are not mountain biking. Based on the disproportionate men: women: non-binary cycling ratio in Northwest Arkansas of 58.2% Men, 39.2% Women, and 2.2% Other², this research hypothesizes more women would like to be mountain biking but are not currently (Jebaraj, 2023). An additional assumption is that the dominant mountain biking community excludes self-identified women due to the low 33% participation rate of women (The National Sporting Goods Association, 2023). Women mountain bikers have reported that men see them and treat them as beginners, give them riding advice they did not ask for, and cause them to feel that they do not belong in the sport (Huybers-Withers, 2015; McCormack, 2017; McCormack, 2020; Nash & Moore, 2021; Roberts et al., 2018). Based on these factors, a final assumption is that these factors add to a system of gendered exclusion.

² I object to the use of the word “other” to describe those outside of the gender binary. This was the term that the study used.

II.

Investigation

“There is no golden ticket that you have to have in order to be a mountain biker. **You get on a mountain bike for the first time and you are a mountain biker**” (Bruhin, 2024).

Research Questions

Main question

How might we design a community of practice that reduces the barriers of entry and fosters empowerment for self-identifying women interested in mountain biking?

Sub-questions

- 1. How does a sense of belonging impact participation in extreme sports?
- 2. How do gender and skill level impact one’s experience of community in mountain biking?
- 3. How are mountain biking communities formed and/or fortified through digital platforms and social media?

Literature Review

I. Introduction

Mountain biking is a fairly new sport born in the 1980s on the Western coasts of the U.S. and Canada, and researchers have yet to study it at a large scale (McCormack, 2020). This project, however, is not just about mountain biking but about community and identity, using the lens of mountain biking to view how women form groups. Though mountain biking as a sport has been under-researched, a handful of dedicated researchers have written about the gendered mountain biking subculture: scholars including Karen McCormack, Sherry Huybers-Withers, and Belinda Wheaton have each written extensively on the subject. I assembled the review of literature by theme to envision the state of mountain biking in its current context and provide a baseline for further research. The main research categories are gender and extreme sports, community, and feminist theory. I included the newest sources available and only referenced older sources if they had relevant frameworks. Sources were not limited to the U.S. but included papers from the U.K., Canada, and Australia. Most studies about mountain biking are conducted in Western countries, though the sport is spreading worldwide (Wheaton, 2010).

II. Gender and Extreme Sports

Background on Cycling
An essential narrative thread of this research is the interaction of gender and extreme sports. Cycling has not only shaped American culture but also led to breakthroughs in manufacturing and infrastructure and aided in the U.S. women’s suffrage movement of the mid-19th century (Angier, 2015). Bicycles allowed women to leave the house independently and travel a substantial distance for the first time without relying on a man for transport (Angier, 2015). Cycling was a mode of empowerment, and women who had access to bicycles gained a sense of freedom through transportation (Angier, 2015). Even though mountain biking has historically been a male-dominated sport, and primarily still is, women’s cycling has roots as a feminist practice.

Though cycling was a vehicle to empower women, certain members of society did not always view it favorably. In the

late 19th century, doctors writing for publications including the Literary Digest and London’s National Review warned women patients about the dangers of bicycling: they might get a terrifying affliction called *bicycle face*, a strained, weary, scrunched-up look that women cyclists would get during exertion, causing them to be unattractive to the dominant culture (Stromberg, 2015). Some doctors even warned that this condition could be permanent and additionally insisted that women did not have the strength to perform this type of activity (Stromberg, 2015). Bicycle face is an early example of the way society excluded women from participating in cycling in the U.S. and made them feel bad about doing something freely and independently.

Sports participation + demographics
Research into outdoor activities is imperative due to the growth in the number of Americans participating outdoors and the cycling participation rate. Outdoor participation in 2022 in the U.S. was at an all-time high, with 168.1 million Americans participating outside (The Outdoor Industry Association, 2023). Cycling had almost 23% annual growth in participation in 2022 across all types of cycling, and 108 million Americans (34% of the population) reported riding a bicycle in 2023 (Corona Insights, 2023; The Outdoor Industry Association, 2023). However, minority groups are still highly underrepresented in outdoor participation as of 2022: 56% of Latinx Americans and 40.7% of Black Americans engage in outdoor activities (The Outdoor Industry Association, 2023). Black Americans are still the most underrepresented group in outdoor participation (The Outdoor Industry Association, 2023). This research is consistent with local data from Northwest Arkansas. The racial group most likely to utilize outdoor multi-use biking and walking trails with frequency at least once or twice a month is White Americans at 80%, with Latinx, Asian, Black, Pacific Islander or Marshallese, and Indigenous Americans totaling under 20% (Trailblazers et al., 2021). Over 6.4 million Americans participated in mountain biking in 2022: 67% of mountain bikers identified as men, and 33% identified as women (The National Sporting Goods Association, 2023). There is a data gap in outdoor research regarding anyone outside of the gender binary, as most industry reports, for instance, the National Sporting Goods Association, only include the categories of men and women.

In Northwest Arkansas, 58.2% of cyclists identified as men, 39.2% identified as women, and 2.2% identified as other (Jebaraj, 2023). Women’s participation in cycling is almost 10% lower than men’s in this part of Arkansas. Over one-third of Northwest Arkansas reported riding a bike last year; 41% rode their bike 3-9 days per month, and 12% rode 20 or more days per month (Jebaraj, 2023). This data indicates a highly active cycling community.

The mountain biking culture

The literature review demonstrates that the mountain biking sub-culture welcomes newcomers and provides participants with a sense of identity, community, and camaraderie (McCormack, 2017; McEwan, 2016; Robert et al., 2017). Mountain biking can represent the future of sportsmanship in terms of co-participation, supportive networks of riders, and the ethos of knowledge-sharing amongst this community (2016). McEwan deems mountain biking a postmodern sport because it does not follow the modern sports model of dominating an opponent and has a community framework (McEwan, 2016). McEwan writes, “The emergence of interdependent support networks within extreme sports such as mountain biking can serve to make sports more accessible and open to new participants” (2016, p. 278). The role of co-participation is essential in the formation of mountain biking communities. McCormack found that a significant source of support for women mountain bikers came from ride clinics, where participants reported building a strong sense of community (2020).

“Action sports, and leisure activities more generally, are an important site not only for play but also for community formation. When these spaces are unwelcoming, it prevents people from experiencing the deep connection and freedom that can come from sharing the experiences of nature, risk, challenging fears, and physical boundaries. More inclusive leisure communities can expand these opportunities and begin to create broader, more heterogeneous communities” (McCormack, 2020, p. 123).

Mountain bikers create identity and community through participatory practices of teaching new riders the ropes of off-road riding; this phenomenon does not parallel other extreme sports, such as windsurfing or skateboarding, and appears unique to mountain biking (McCormack, 2017). Mountain biking as a sport has the most potential for community organizing and belonging out of any extreme sport due to its culture of co-participation and knowledge-sharing.

The market

Historically, mountain bikes were manufactured by and for men. However, the market is slowly changing, and more women’s bikes are entering the equation. The Juliana mountain bike was the first ever high-quality mountain bike made specifically for women (Carpier, 2014). Companies are starting to build first-rate bicycles specifically for women’s bodies, rather than women simply picking the closest fitting men’s bicycles. However, women-specific mountain bikes are in the minority of overall options and there is still a considerable price barrier for many women to access these high-quality products needed for the sport. Furthermore, it is difficult to accurately track how many women purchase mountain bikes because many will buy a man’s model or secondhand bike (Carpier, 2014).

Cult of Masculinity

“White dudes shredding trails” have historically defined mountain biking, and this culture largely prevails today. Nash and Moore define the concept of *masculinity* as “a socially constructed component of gender identity that is typically associated with men” (2021, p. 455). They maintain that a primary barrier in extreme sports culture is that it only recognizes women’s achievements as compared to men, creating a framework of deference to masculinity (Nash & Moore, 2021). A review of the literature, however, demonstrates that it is more than a deference to a framework; it is analogous to a cult-like worship of masculinity.

Huybers-Withers discusses how masculinized ideals permeate traditional sports and extreme sports, specifically mountain biking, and create a culture that rewards risk, leading to injury and general safety concerns (2015). Mountain biking is marketed as an inclusive and egalitarian

sport but still has many gendered practices perpetuated by the hyper-masculine idealized mountain biker (Huybers-Withers, 2015). The cult worships this archetypal masculine mountain biker. As Huybers-Withers writes, “Similar to the alternative sports of ultimate frisbee, skateboarding, snowboarding, windsurfing, climbing, and adventure racing, the ideal hegemonic masculine version of a mountain biker exists in many contexts along with a pervasive and systematic acceptance of the patriarchal gender hierarchy” (2015, p. 174). Though mountain biking has historically and systematically perpetuated traditional gender roles and masculinity, some riders are creating a new mountain biking subculture that is anti-hierarchical and inclusive (Huybers-Withers, 2015). Examples of these egalitarian rider practices are men who teach women how to ride, family rides, and women-specific group rides with women teaching women (Huybers-Withers, 2015).

Two prime examples of the cult of masculinity in mountain biking are the Red Bull Rampage and the Cape Epic Race. The Cape Epic Race, held in Cape Town, South Africa, has been deemed the “Tour de France” of mountain biking (Bordelon & Ferreira, 2019). Over 90% of the race participants in 2015 were white men of a well-positioned socio-economic status: over half were business owners, and almost 70% of riders were in upper-management positions (Cape Epic, 2015). Though the demographics of extreme sports are becoming more diverse as time progresses, there is the smallest representation among women and minorities in bike races (Bordelon & Ferreira, 2019). Not only does the Cape Epic have a mere 10% level of women’s participation, but the women cyclists endure an established “boys’ club” that openly flaunts their objectification through, for example, sexist team names (Bordelon & Ferreira, 2019). While mountain bike racers make up a fraction of overall riders, it is essential to look at the elite form of mountain biking to see how it informs the environment of more casual and hobbyist riders (Bordelon & Ferreira, 2019).

The Red Bull Rampage, sponsored by the eponymous energy drink company, is a yearly invite-only free-ride³ mountain biking competition, the most dangerous and high-profile there is (McGinn, 2023). The Rampage is so exclusive that Red Bull only sends twenty invitations a year, and a woman has never been invited since its inception in 2001 (McGinn, 2023). Even though there are more men-identifying free-ride mountain bikers than women, a massive influx of women free-riders has occurred in the last five to eight years (Park, 2023). Some women free-riders, including Vaea Verbeeck, are capable of competing at the Rampage but have yet to be invited (Park, 2023). Red Bull sponsored a non-competitive women’s free-ride event called Formation for three years but canceled it in 2023 (McGinn, 2023). Formation was a space for women to practice their craft in a non-competitive environment, hoping to one day compete at Rampage (Park, 2023). There is much speculation about why Red Bull canceled Formation, one theory being a potential future women’s category at the Rampage. Still, it is most likely due to planning issues and not necessarily malintent (Park, 2023). Many are upset that Red Bull has still not invited any women to the competition. Verbeeck calls for creating more spaces for women’s free-ride to support them in elevating their sport until the day Red Bull sends them that most coveted invite (Park, 2023). Numerous articles cite the Red Bull Rampage as a critical problematic event in including women in mountain biking (Huybers-Withers, 2015; Huybers-Withers & Livingston, 2010; McCormack, 2020). Like Cape Epic, this competition is an example of excluding women at the top of the field in competitive mountain biking. People watching this famous event are only seeing men and only associating men with high-level performance mountain biking.

³ Free-ride is one of the more dangerous styles of mountain biking in which riders perform tricks and jumps (McCormack, 2020).

Benefits

Mountain biking has numerous physical, mental, and social benefits. Recent scientific studies have showcased therapeutic benefits, including improved mood, decreased stress and anxiety, and increased self-esteem in extreme sports and outdoor activities; however, there is still a lack of data collection regarding mountain biking (Roberts et al., 2018). This study suggests that encouraging girls to participate from a young age could minimize the gender disparity (Roberts et al., 2018).

Anja Whittington et al. studied the effectiveness of the outdoor adventure program Dirt Divas on resilience in teenage girls (2016). *Resiliency* is the capability to overcome hardship, bounce back, and succeed despite the difficulty of circumstances (Whittington et al., 2016). Dirt Divas is a five-day outdoor mountain biking program based in Vermont for girls aged 10-16. The researchers measured the participants’ resiliency before and after completing this outdoor program. Researchers noticed significant and lasting increases in participant resiliency before and after participation in Dirt Divas (Whittington et al., 2016). Researchers wrote that mountain biking provides beneficial life lessons for participants concerning resilience, such as “getting up when you fall, being determined to tackle challenges, persevering when things are hard, and finding courage to act in the face of your fears” (Whittington et al., 2016, p. 7). Mountain biking can provide excellent built-in life skills and lessons, and it has the capacity for empowerment and improving women’s ability to meet challenges confidently.

Cost + Time

Mountain biking is a costly sport, and many people cannot afford to purchase a mountain bike since entry-level equipment can easily be over \$1000. Full-suspension⁴ bikes are typically over \$3000. However, a new product at Walmart addresses this barrier with a low-cost, high-quality mountain bike. These bikes start at \$198 and go up to \$398, well below any comparable remotely safe products (Stallbaumer, 2023). Mountain bikes must have superior componentry to ensure safe navigation of trails, and this is the first mountain

⁴ Full-suspension mountain bikes have front and rear suspension for a smooth riding experience.

bike sold at Walmart to fit into this category. Walmart’s Ozark Trail mountain bikes meet a need for a community engaged with mountain biking, substantially lowering the cost barrier. Finally, mountain biking requires a significant time commitment. Many parents or caregivers, especially single mothers, do not have the time to drive their children to places where they can go mountain biking or ride themselves. In the U.S., the childcare burden largely falls on the mothers and caregivers, and this can prevent women from learning how to mountain bike or having time to ride (Nash & Moore, 2021).

Race

Outdoor participation is the lowest among minority groups, and this trend is also accurate in mountain biking. Low minority participation in outdoor activities can be traced to the colonization of natural spaces by white Europeans and systemic racism. As of 2022, Black Americans are still the most underrepresented in outdoor participation at 40.7%, but their participation has increased in the last five years (The Outdoor Industry Association, 2023). In Northwest Arkansas, 70.5% of cyclists are white, and 3% are Black (Jebaraj, 2023). Scholarly data concerning the qualitative experience of Black women and non-binary identifying mountain bikers is lacking; however, I hypothesize that Black women face the highest barriers to entry for mountain biking.

III. Community **Communities of Practice**

Etienne and Beverly Wenger-Trayner write about how organizations and specific communities bond through making “communities of practice,” or “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner & Wenger-Trayner, 2015, p. 2). Individuals and groups benefit from the shared experience of making and doing together. Mountain biking is a community of practice, and participants form a relationship with one another while learning and growing together through their shared activity. The community of practice model could enhance the tradition of co-participation in mountain biking through organization of community groups.

Mountain Biking Community

Community networks cultivate goodwill and trust among members through *norms of reciprocity*, also known as the Golden Rule: treat others as you would want to be treated (Putnam, 2020). Well-connected communities benefit not only the people taking part in the engagement but also people who are not even involved, known as bystanders (Putnam, 2020). I hypothesize that creating better systems to connect women's mountain biking communities would increase engagement and foster reciprocity and trustworthiness among the women's mountain biking community.

Social capital theory refers to the concept that social networks are inherently valuable and positively alter the productivity of individual and group members, and *social capital* refers to social connections among people (Putnam, 2020). Community members build social capital through norms of reciprocity. The mountain biking community has value and benefits for its members: women find identity and community when aligning themselves as mountain bikers (McCormack, 2017). Supporting the development of social capital among women mountain bikers would add value and connections among these groups. McCormack writes, “A community has emerged among enthusiasts, providing support, fun, and a shared sense of belonging. Identity as a mountain biker is premised upon the perceived unique characteristics of the activity and the participants” (McCormack, 2017, p. 344). The shared interest and experience of mountain bikers bond

the participants in the group. The dedicated core mountain bikers create chosen communities linked by their mutual objectives and commitment to the participants (McCormack, 2017).

Group rides, a significant source of support for women mountain bikers (McCormack, 2020), are one of the ways experienced riders bring new riders into the sport and teach them the necessary skills and safety protocols (McCormack, 2017). Many mountain bikers socialize while exercising, and forming a community through the sport can make riders feel a sense of belonging. McCormack writes, “Women-only group rides and clinics can create a more welcoming — and often explicitly feminist — site for women's participation” (2017, p. 344). The programming of group rides and social events for women mountain bikers is a way to cultivate social capital among this group. The group ride phenomenon does not have a parallel in other extreme sports and is unique to mountain biking (McCormack, 2017).

Communication

A review of the literature has determined that women fabricate their own spaces to communicate, separate from the hegemonic society (McCormack, 2020; Place, 2023). Place writes, “Today, feminist communities of solidarity take many forms, carving out intentional physical or digital spaces of resilience and mutual aid or emerging out of necessity in patriarchal contexts such as workplaces and academic institutions” (2023, p. 190). One can see this phenomenon in mountain biking through the manner in which participants communicate and the virtual groups they form. McCormack researched how women use communication strategies to create mountain biking communities where they can participate freely (McCormack, 2020). Women in this study felt less represented by media in the dominant mountain biking culture, for instance, the websites PinkBike and M.T.B.R. (McCormack, 2020). Instead, they formed smaller communities via Facebook and Instagram to connect with other women riders (McCormack, 2020). New media modes of communication open doors for people to create their own spaces and challenge dominant assumptions of participation (McCormack, 2020). While many of these virtual communities form ad hoc to meet a variety of needs of participants, one can facilitate these communities with intention and organization.

Northwest Arkansas (N.W.A.)

Mountain biking communities are abundant in Northwest Arkansas, from businesses to 501(c)(3) organizations to social media pages. Below is an overview of examples of mountain biking communities in NWA:

501(c)(3) Organizations: N.I.C.A. (National Interscholastic Cycling Association), PeopleforBikes, Women of Oz, Arkansas Latinas en Bici, All Bikes Welcome, Bike.POC, O.O.R.C. (Ozark Offroad Cyclists), Trailblazers

Businesses: Phat Tire, Bike Route, The Hub, The Meteor, Highrollers, Mojo, Allied Cycleworks, The Peddler’s Pub, Spoke Adventures, Bentonville Bicycle Company, OZ Bike Fit & Tech, Gearhead, Pedego Electric Bicycles, Specialized Bentonville Experience Center, Magnolia Cycles

Social Media Pages: Oz Shredders, NWA. Flow Feed, OZ Trail Conditions, F.A.S.T. Facebook group (Friends of Arkansas Single Track)

Ride Groups: Women of Oz, F.A.S.T., Latinas en Bici, O.O.R.C.

Imagining

When creating a community, one must imagine it. All communities are imagined, regardless of whether the community is real or made up (Anderson, 2016). According to Anderson, the defining property of a community is the manner and style in which it was imagined (2016). In other words, the context of how the community is conceptualized matters. If all communities are an exercise in imagination, then one can imagine more equitable and anti-hierarchical communities for the future. I firmly believe women’s mountain biking communities have the potential to be re-imagined. Imagining can even be a feminist act. As Sara Ahmed writes, “Feminist theory is world making” (2017, p. 14). This researcher envisions these women mountain biking communities as well-connected, inclusive, welcoming, and anti-hierarchical worlds.

IV. Feminist Theory **Intersectionality**

Kimberlé Crenshaw is a critical race theorist and black feminist legal scholar who coined *intersectionality* in two essays in 1989 and 1991. Crenshaw calls for a study of race and gender at the point where the two concepts intersect, not treated as two ideas existing separately (1989). Crenshaw is critical of the *single-axis framework* of dominant culture, which studies race and gender as separate entities (1989). The single-axis framework is the model of basing gender discrimination on white women’s experiences and basing racial discrimination on the experiences of highly privileged Black people, often Black men (Crenshaw, 1989). Race and gender must be studied hand-in-hand because neither lived in a void. The feminist movement has historically excluded black women from feminist thought and instead framed the movement around white women (Crenshaw, 1989). Crenshaw writes, “Feminism must include an analysis of race if it hopes to express the aspirations of non-white women. Neither Black liberationist politics nor feminist theory can ignore the intersectional experiences of those whom the movements claim as their respective constituents” (1989, p. 166). Studying how the different aspects of a person’s identity intersect is crucial in beginning to understand their experience and how they form communities. Intersectionality is a significant concept in studying women’s mountain biking communities because women form communities for different reasons, come from different backgrounds, and have unique experiences. All of these factors intersect and affect how they relate to people.

Word Embeddings

Word embeddings are a machine-learning framework used to look at data to see how often certain words positively or negatively correlate with each gender, race, or ethnicity (Garg et al., 2018). Researchers can use word embeddings to understand a country’s relationships with words and see how language can perpetuate bias and stereotypes (Garg et al., 2018). Computer scientists and historians at Stanford created the concept of word embeddings as a machine learning technique to study how gendered language has been embedded into the gender binary to favor men on words including “intelligent, logical, and thoughtful” (D’Ignazio & Klein, 2020, p. 161; Garg et al., 2018). Huybers-

Withers argues that the hegemonic type of mountain biker is an idealized masculine person who is highly competitive and displays masculine traits (2015). I hypothesize that word embeddings have a role in perpetuating this idealized masculine male rider by associating language including “competitive” and “gnarly” with men and words such as “cautious” and “amateur” with women.

The Gender Data Gap + Default Male

Women have been historically systematically excluded from research on the assumption that the default human is a man and women are simply a niche offshoot (Criado Perez, 2019). This concept is called the *default male* (Criado Perez, 2019). As Caroline Criado Perez writes, “The lives of men have been taken to represent those of humans overall. When it comes to the lives of the other half of humanity, there is often nothing but silence” (2019, p. xv). Men’s experience in mountain biking is portrayed as the default, making it hard for women to break into the sport and rise to the top competitively, as seen in the Cape Epic Race and the Red Bull Rampage (Bordelon & Ferreira, 2019; McGinn, 2023). The default male in mountain biking also appears in the manufacturing and advertising of mountain biking products. For example, McEwan and West conducted a content analysis of 218 mountain bikes to categorize and create a model for the market (2017). The paper fails to mention in the abstract or introduction that they decided not to use any women’s bikes in this content analysis (McEwan & West, 2017). This source exemplifies how women who mountain bike and women’s mountain bike products are under-researched and even blatantly excluded from studies. The default male additionally appears in Huybers-Withers and Livingston’s content analysis of the mountain biking subculture (2010). The researchers analyzed print ads from *Mountain Biking Action* magazine from 2000-2008 to see how mass media portrays and defines mountain bikers and masculinities (2010). During the eight years, the magazine reviewed over 500 bikes, and only six were women’s bikes (Huybers-Withers & Livingston, 2010). Additionally, not a single woman appeared in the main columns of the magazine during this time (Huybers-Withers & Livingston, 2010).

Finally, the male default appears in the gender-neutral assumption among men mountain bikers; in her 2020 study, McCormack writes, “Many riders claim that the activity itself is gender neutral, and yet the skilled rider is often imagined as male” (2020, p. 120). Whereas almost all of McCormack’s men-identifying participants stated that gender does not matter in mountain biking, most women-identifying participants responded that gender does matter in mountain biking (2020). Most of the dominant society in mountain biking sees mountain biking as a gender-neutral sport, a narrative that leaves out the experiences of minority groups in the sport.

V. Conclusion In summary, the review of the literature demonstrates many data gaps, including demographic data on mountain biking, research on extreme sports in general, and research on women in extreme sports, to name a few. However, this literature has focused on gathering the available mountain biking research and compiling it with a focus on community. The manufacture of a growing number of women-specific mountain bikes indicates more women are joining the sport, and the market is shifting accordingly. Mountain biking has boundless potential for community facilitation due to its culture of co-participation and knowledge-sharing. Though mountain biking has historically perpetuated a worship of masculinity and adrenaline, some riders are creating a new mountain biking subculture that is anti-hierarchical and inclusive, involving co-ed ride groups and family rides. This activity could become more inclusive by intentionally building a mountain biking community that values co-participation, diversity, and a wide variety of levels.

Precedents

Northwest Arkansas has a highly active cycling community and numerous community organizations working to make mountain biking a more inclusive and welcoming sport. Some focus on gender in mountain biking while others focus on diversity and equity. These groups serve as precedents for mountain biking community formation in the area. Below is a short list of local mountain biking activism and community engagement precedents.

Trailblazers

Trailblazers is a non-profit formed in 2021 that advocates for creating and maintaining paved and off-road trails. They have not only been the leading force in creating the over 300+ miles of trails in Northwest Arkansas but also perform community outreach and advocacy work through programming and research. Their mission is to “lead the development of an innovative regional recreation and transportation movement that places trails, cycling, and active transportation infrastructure at the core of an inclusive, vibrant, and healthy culture” (Trailblazers, 2021).

Bike.POC

Beatrice Apple and Kim Seay started *Bike.POC* in 2021; a local Northwest Arkansas initiative of the 501(c)(3) Trailblazers organization. Their mission is to “foster diversity, equity, and inclusion in the cycling and active transportation worlds by advocating for policy changes, building public awareness, and empowering marginalized communities to create an inclusive built environment. Our collaborative efforts aim to break down barriers and pave the way for a more equitable and accessible future for everyone” (Bike.POC, 2021). I had the pleasure of becoming acquainted with Beatrice and Kim through the joint Juneteenth ride organized by Bike.POC and All Bikes Welcome.

All Bikes Welcome

All Bikes Welcome is a local Northwest Arkansas 501(c)(3) organization that organizes the Grit MTB⁵ Festival yearly. Their mission is “to build more racial equity and gender diversity in cycling by providing free and low-cost outdoor

⁵ MTB stands for mountain bike or mountain biking, depending on the context.

programming in the Northwest Arkansas corridor. We invite folks from a variety of backgrounds to participate in our programs from the “never touched a mountain bike” to the advanced rider. Our goal is to create and support an emerging base of beginner mountain bikers and outdoor enthusiasts by providing opportunities to learn and grow in a fun, supportive, and low-stakes environment” (All Bikes Welcome, 2019). I met with numerous board members and staff at this organization through Grit MTB Fest and other rides I attended with them.

Latinas En Bici

Latinas En Bici is a local Northwest Arkansas 501(c)(3) promoting cycling in the Latinx community. Their mission is “to improve the social and physical well-being for Latinas through our Biciescuela Clases, weekly bike rides and multicultural events” (Latinas en Bici, 2019). Their programming centers on group rides, fundamental mountain bike skills, multicultural events, and engaging families to ride together. They often partner with Women of Oz and All Bikes Welcome for their events.

Women of Oz

Women of Oz, commonly called “WOZ,” is a Northwest Arkansas 501(c)(3) founded in 2019, empowering women to get on mountain bikes. Their mission is to “Get women on mountain bikes by breaking down barriers” (Women of Oz, 2019). WOZ holds a free monthly group mountain bike ride for all riding levels with certified instructors. There is always a social activity involving food and drinks after. Additionally, they hold other weekly rides and social events, and their primary fundraiser is the Sunset Summit, which I have attended twice.

Methods

Because this topic directly addresses the topic of gender dynamics, I applied an intersectional feminist theoretical framework to conduct this research. Kimberlé Crenshaw coined *intersectionality* 1989; it refers to individuals' different societal positions and how the different aspects of their positionalities intersect (Crenshaw, 1989). Women, or people that society perceives to be women, are treated differently based on their gender and how the different facets of their positionalities interact and intersect with their gender. Feminist frameworks question power structures, cultural and sociopolitical contexts, the role of institutions, and the positionalities of the people who conducted the research (D'Ignazio & Klein, 2020). In other words, "Research conducted within a feminist framework is attentive to issues of difference, the questioning of social power, the resistance to scientific oppression, and a commitment to political activism and social justice" (Hesse-Biber et al., 2004, p. 3). In studying women mountain biking communities, I am interested in discovering how these different power structures affect community formation and individual experience.

When conducting feminist research, it is important to acknowledge that feminism has historically excluded women who were not white and privileged, ignoring the experiences and intersectionalities of Black, Indigenous, and People of Color (BIPOC) women. I situated this research in the context of my own positionalities as well as those of the scholars I have researched and the study participants. As bell hooks writes, "We resist hegemonic dominance of feminist thought by insisting that it is a theory in the making, that we must necessarily criticize, question, re-examine, and explore new possibilities" (2000, pp. 10-11). Feminist research is a process that is open to expansion, building, and collaboration. All research, including this study, is situated within complex power systems.

I designed this research methodology using a *mixed methods approach* often used in feminist research as a data triangulation method. A mixed methods approach

utilizes quantitative and qualitative data in a study and then triangulates it to find the research narrative (Lecompte & Schensul, 2020). *Triangulation* is cross-checking and comparing data from various sources to determine accuracy (Lecompte & Schensul, 2010). The methods were chosen and designed to gather a range of narratives and experiences. As Place writes, "Feminist design calls for a plurality of open-ended, responsive outcomes that address the complexity of both individual experiences of marginalization and the underlying causes of systemic oppression" (2023, p. 119). A mixed methods approach addresses the complex intersectionalities of the research participants and gives space for cross-referencing and critical questioning.

Early Studies

Immersion
Immersion is the act of the researcher embedding themselves in the community or culture they are studying to gain first-hand experience with how this group behaves (LeCompte & Schensul, 2010). I chose to immerse myself in a group I am already a part of to avoid asserting dominance as a researcher and instead collaborate with the mountain biking community as equals and peers, thus employing feminist ideals of subverting power dynamics in the immersion tactics. I first investigated my research question by attending two women-, trans-, and non-binary-focused mountain biking events in Northwest Arkansas. The events were the Women of Oz Sunset Summit on September 15-17th, 2023 and Grit MTB Festival on September 29-October 1st, 2023. I used the ethnographic method of semi-structured observation at these two events as a starting point for my mini-studies. Semi-structured observation is an immersion method of informal observation in which a researcher can obtain baseline information for their study (Martin & Hanington, 2019). I wrote notes of significant points from festival conversations and took photographs and video documentation. Figures 3-5 display images from Grit MTB Festival and Figures 6-7 show images from the Women of Oz Sunset Summit.

Figure 3
Grit MTB Festival



Note. This photo was taken by Emily Sierra, 2023 from Grit MTB Festival. Faces were blurred to protect the privacy of riders.

Figure 4
Grit MTB Festival



Note. This photo was taken by Emily Sierra, 2023 from Grit MTB Festival. Faces were blurred to protect the privacy of riders.

Figure 5
Grit MTB Festival



Note. This photo was taken by Emily Sierra, 2023 from Grit MTB Festival. Faces were blurred to protect the privacy of riders.

Figure 6
Women of Oz Sunset Summit



Note. These photos were taken by various riders at the festival. Faces were blurred to protect the privacy of riders.

Figure 7
Women of Oz Sunset Summit



Note. These photos were taken by various riders at the festival. Faces were blurred to protect the privacy of riders.

Early Studies

Systematic Observation

After immersing myself in the mountain biking sub-culture using semi-structured observation, I began a systematic observation. *Systematic observation* is a formal version of observation, usually involving a predetermined set of parameters or a worksheet to keep track of data (Martin & Hanington, 2019). After attending Grit MTB Fest and the Women of Oz Sunset Summit, I systematically observed every time I went mountain biking from October 2023 until January 2024. I took notes on riding experiences and demographic data of those I saw on the trail. See Appendix A for complete ride-tracking criteria.

I acknowledge that not all people identify how they present and observation is subjective. However, triangulating my data using a mixed methods approach will aid in avoiding subjective bias. I mountain biked seven times between October 7th, 2023, and January 7th, 2024. Although this is not enough to be statistically sound, it can add perspective to the demographics from massive industry surveys. Of the seven rides, I rode with co-ed groups four times, women-only groups two times, and a woman one time.

Red Bull Rampage Case Study

I conducted a miniature inductive content analysis of the mountain biking subculture by studying the comment section from an Outside Magazine Instagram post about the Red Bull Rampage, a yearly invite-only free-ride mountain biking competition discussed in section II: Gender and Extreme Sports of the Literature Review.

There are currently more men-identifying free-riders than women, which can only partially account for the gender disparity among invitees (Park, 2023). Red Bull has never invited a woman to the competition since its inception in 2001 (McGinn, 2023). However, a massive influx of women free-riders has occurred in the last five to eight years, and some women, for instance, Vaea Verbeeck, are capable of competing at the Rampage (Park, 2023). Many are upset that Red Bull has still not invited any women to the competition. The comment section of this post highlights the toxic traits of gender-related issues in the mountain biking community: male privilege, sexism, and hegemonic masculinity, and the

supportive traits of riders calling for a women’s division of the Rampage and more support, coverage, and resources allocated for women riders. I took a sampling of the comments of this post that showcased the themes of the community and compiled them into a visual essay as a case study, as seen in Figure 8. The harmful and toxic comments far outnumbered the positive comments, but I chose to showcase both to represent both ends of the spectrum.

Concept Map

I created a concept map to understand the complexities of mountain biking communities and barriers and how the different aspects interact as a system. A *concept map* is a “sense-making tool that connects many ideas, objects, and events as they relate to a certain domain” (Martin & Hanington, 2019, p. 50). By creating a concept map as seen in Figure 9, I determined the four main categories of issues when looking at the women’s mountain biking community in Northwest Arkansas: the community, the barriers, the culture, and gender.

Figure 8
Case study of the Red Bull Rampage

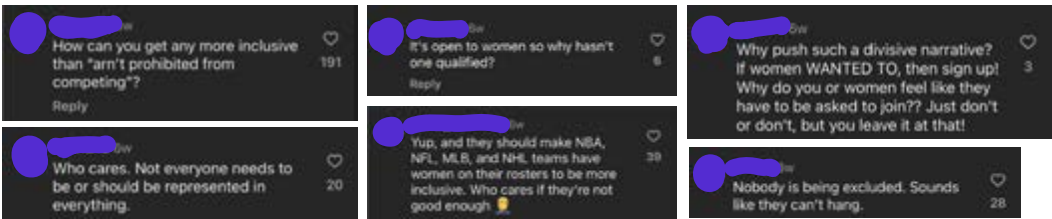
A content analysis of the
Red Bull Rampage comment section

toxic comments

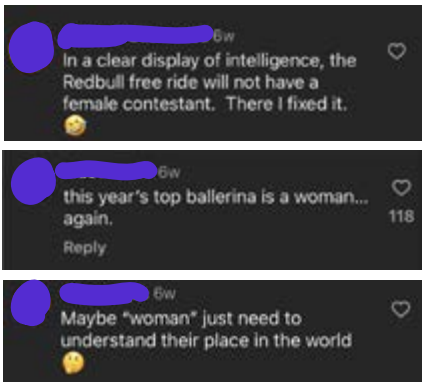
Women Seen as Inferior Athletes



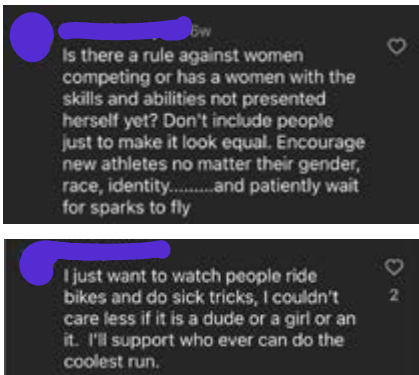
A Negative View of Inclusivity



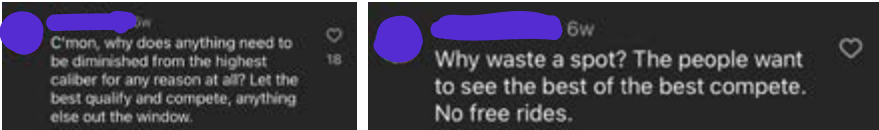
Blatant Sexism



The "gender-neutral" argument

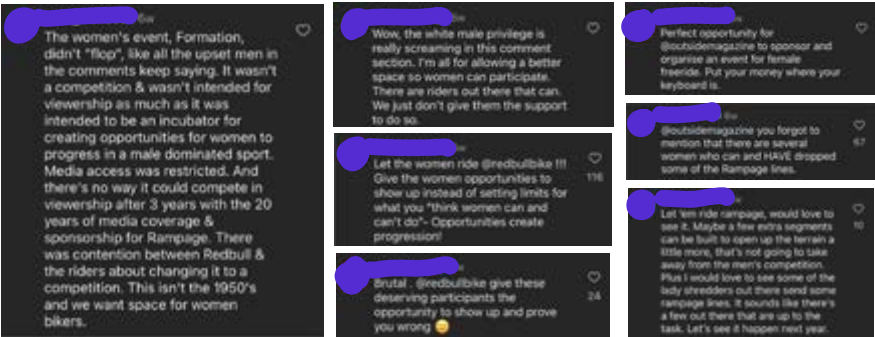


Idea that allowing women to join would lower the quality of the sport

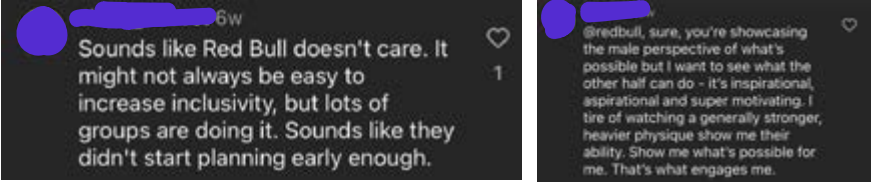


supportive comments

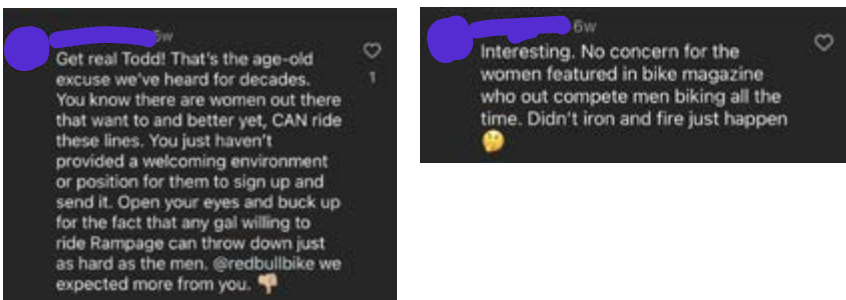
Space + Opportunity for Women Athletes



Parallels in other Extreme Sports



Media portrayal of Women Athletes



Misinformation

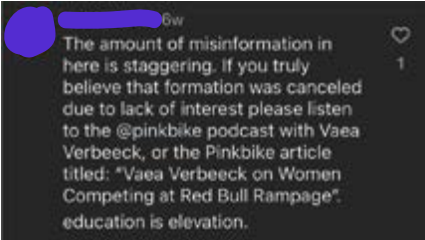
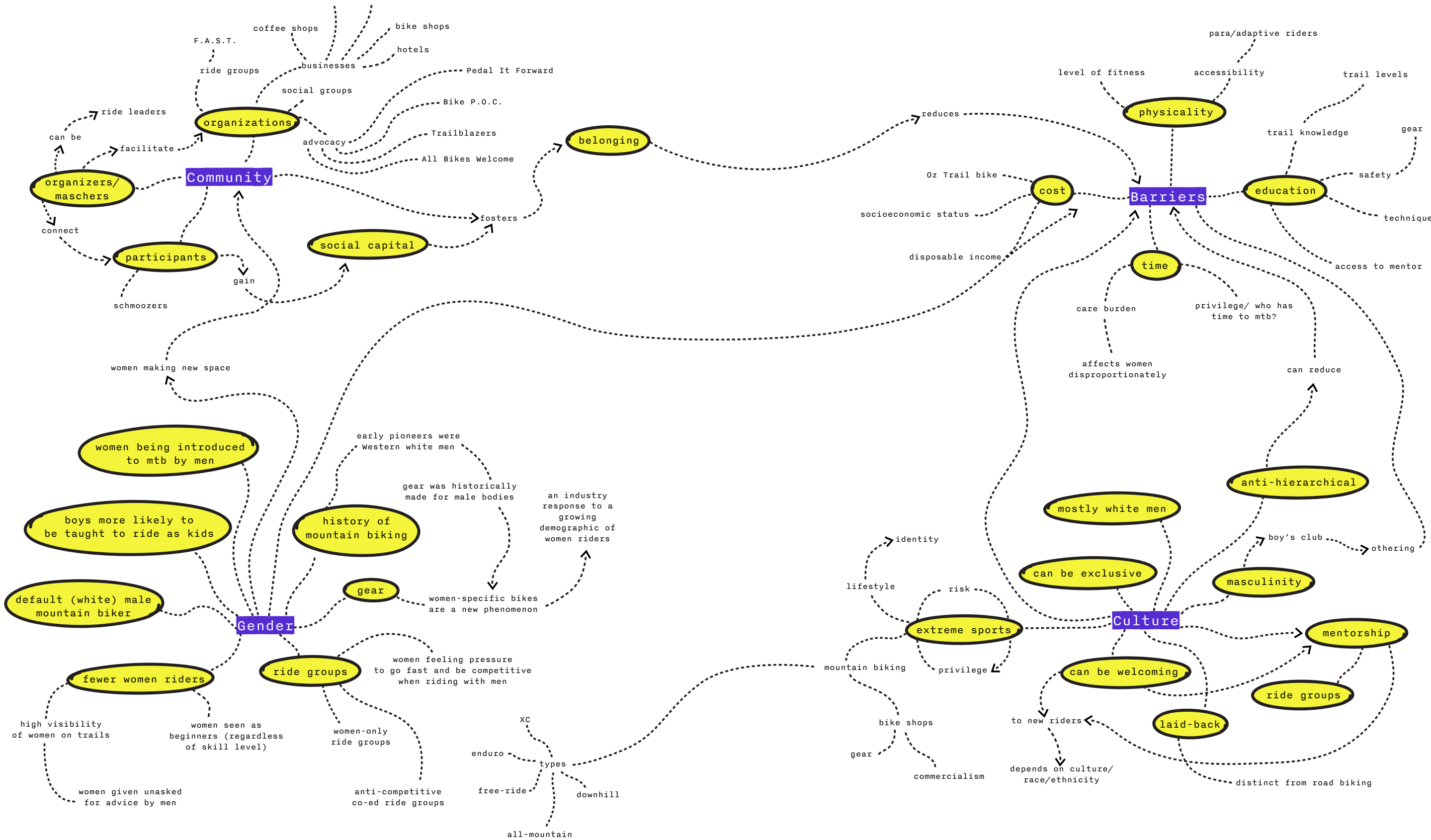


Figure 9
Concept map

WOMEN MOUNTAIN BIKING COMMUNITY IN NORTHWEST ARKANSAS



Primary Methods

Semi-structured interviews
Semi-structured interviews are a feminist qualitative data collection method that includes a “free interaction between the researcher and interviewee” (Reinharz, 1992, p. 18). Semi-structured interviews have a set sample of questions but with space for the interview to go in unexpected and exciting directions. Many feminists utilize this method because it allows for an open discussion between the interviewer and interviewee (Reinharz, 1992). Additionally, semi-structured interviews give agency to the interviewee to take the conversation where they would like, thus subverting the historical power dynamics of the researcher in a position of power over the interviewee. I chose semi-structured interviews to create a feminist environment where the conversation was personable and informal.

I conducted 10 individual interviews with self-identified women mountain bikers over the age of 18 who live in Northwest Arkansas. I gave the participants the choice of an in-person or Zoom interview based on their comfort level and schedule. I conducted half of the interviews via Zoom and half in person at coffee shops around Northwest Arkansas. Lastly, I conducted one semi-structured expert group interview with two local women, chosen for their experience with building women mountain biking communities. Bea Becerra is on the boards of All Bikes Welcome, Bike.POC, and Latinas en Bici and has extensive experience in creating inclusive programming. Anya Bruhin is the director of Outdoor Education at the University of Arkansas, a coach for N.I.C.A., and a Women of Oz ride leader. We met and discussed the mountain biking culture, barriers to entry, and intervention ideas. See Appendix B for interview questions.

Survey
I used the quantitative *survey* method to obtain a sample of the population as large as possible in a short time. I asked questions about demographics, barriers to entry into mountain biking, experiences in mountain biking, and, most importantly, the community. I created one set of questions for women interested in mountain biking and one for those currently mountain biking. Ninety-nine women responded to the survey. Eighty-one percent of respondents were current mountain bikers, and 19% were interested in mountain

biking. The survey contained a mixture of quantitative and qualitative answer options. To advertise the survey, I distributed fliers around public spaces in Northwest Arkansas, including libraries, coffee shops, bike shops, and the University of Arkansas campus. Additionally, I sent out emails, wrote a blurb for the University of Arkansas Newswire, posted on Facebook and Instagram, and sent information directly to interested women mountain bikers in my circle. See Appendix C for the complete list of survey questions.

Content Analysis
I conducted an inductive content analysis of the mountain biking subculture utilizing digital and physical communication methods. *Content analysis* is a systematic approach to analyzing written, spoken, or visually presented content, keeping count of the instances in which they appear and developing the data coding from the systematic content analysis (Martin & Hanington, 2019).

I systematically observed mountain bikers’ posting practices online on Instagram and Facebook. I studied 33 Instagram posts about mountain biking on my feed and analyzed a local Northwest Arkansas Facebook group called F.A.S.T. (Friends of Arkansas Single Track). F.A.S.T. is a highly active co-ed group ride organization hosting weekly rides and social events. Their Facebook page is a digital space where riders communicate about rides and events and has around 6,5000 members. I analyzed 32 “most relevant” posts from the F.A.S.T. Facebook group page.

Additionally, I observed the physical communication methods of a zine and a magazine. I coded two articles from *Making Space and Stepping Back*, a mountain biking zine published by Radical Adventure Riders, and a *Bike Arkansas* magazine article about Jess Hana, the avid mountain biker and social media sensation.

Frameworks

Conceptual Framework

The conceptual framework for this research combines the principles for cultivating communities of practice theory from Wenger-Trayner et al. with the moments of belonging theory from Susie Wise. The seven principles for cultivating communities of practice are:

1. Design for evolution.
2. Open a dialogue between inside and outside perspectives.
3. Invite different levels of participation.
4. Develop both public and private community spaces.
5. Focus on value.
6. Combine familiarity and excitement.
7. Create a rhythm for the community.
(Wenger-Trayner et al., 2002)

The conceptual framework for this research focuses on Principle 3: Invite different levels of participation. The three primary levels of community participation are the core group, the active group, and the peripheral group (Wenger-Trayner, 2002). The *core group* is the vibrant hub of the community. The *active group* participates regularly, and the *peripheral group* participates rarely (Wenger-Trayner, 2002). The idea of inviting different levels of participation is the understanding that people participate in communities for a plurality of reasons and at different degrees, and regardless of what level they participate at, each level should be invited to the table and designed intentionally. Wenger-Trayner et al. write, “The key to good community participation and a healthy degree of movement between levels is to design community activities that allow participants at all levels to feel like full members” (2002, p. 57). The three main levels are fluid and members will often move between them. The *group coordinator* is a person who comes from the core group

and connects community members by organizing events (Wenger-Trayner, 2002). The people outside of the three main groups are those who contribute a product or service to the community: the suppliers, customers, and intellectual neighbors (Wenger-Trayner, 2002). The last group outside the three main levels is the *outsiders* who are people not in the community (Wenger-Trayner, 2002). In the context of this research, the outsiders are the women mountain bikers who are interested in riding but are not currently riding.

Susie Wise provides a framework for cultivating belonging in community spaces called *moments of belonging*. Wise defines belonging as “being accepted and invited to participate; being part of something and having the opportunity to show up as yourself” (2022, p. 3). Moments of belonging are key points during a journey or activity in which one either feels a sense of being a part of a shared experience or a sense of not fitting in, known as othering (Wise, 2022). The moments of belonging are the invitation, entering, participating, code-switching, contributing, flowing, dissenting, repairing, and diverging and exiting. These moments are opportunities for a designer to intentionally create an artifact to help foster belonging during a group experience (Wise, 2022). These moments of belonging apply directly to the experience of joining a mountain biking community or even a single mountain biking event. However, one can use moments of belonging in any community setting. This conceptual framework focuses on the first three moments of belonging: the invitation, entering, and participating (Wise, 2022).

The two theories interact as follows in Figure 10:

1. A group coordinator is trying to plan a beginner mountain biking workshop for interested self-identified women.
2. The coordinator from the core group will send an invitation to outsiders who are not currently in the community.
3. The active participants can contribute by volunteering their time to help at the event while the suppliers contribute by supplying bikes for the workshop.
4. Once the outsiders receive an invitation, they enter and participate in the space, i.e., the mountain biking workshop.

Figure 10

3 main levels of community participation

(Wenger-Trayner et al., 2002, Fig. 3.1, p. 57)

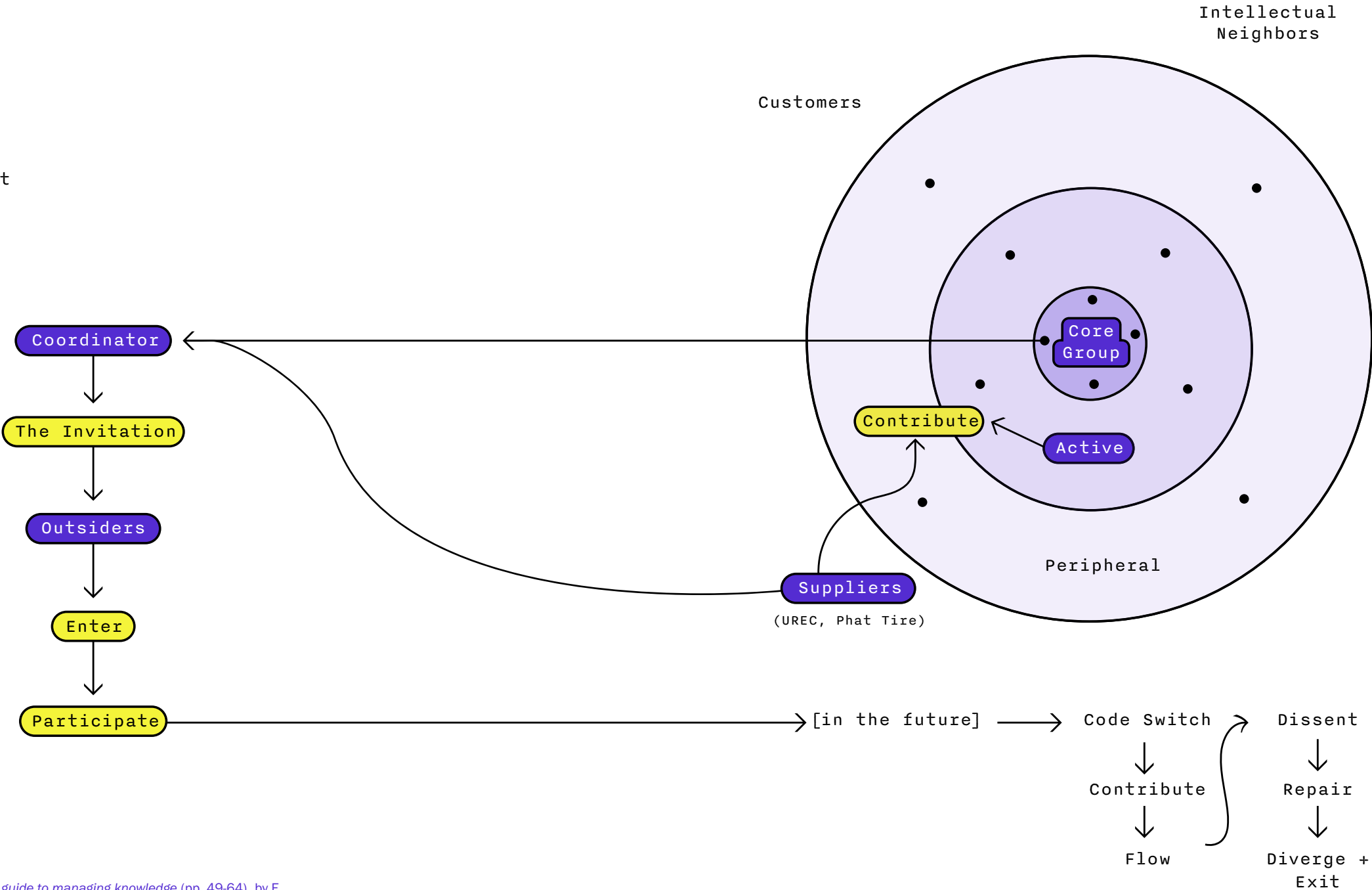
7 Principles of Communities of Practice

(Wenger-Trayner et. al, 2002)

1. Design for evolution
2. Open a dialogue between inside and outside perspectives
3. Invite different levels of participation
4. Develop both public and private community spaces
5. Focus on value
6. Combine familiarity and excitement
7. Create a rhythm for the community

Moments of Belonging
(Wise, 2022)

1. The Invitation
2. Entering
3. Participating
4. Code Switching
5. Contributing
6. Flowing
7. Dissenting
8. Repairing
9. Diverging + Exiting



Note. This framework was adapted from *Cultivating communities of practice: A guide to managing knowledge* (pp. 49-64), by E. Wenger-Traynet et al, 2002, Harvard Business School Press and a framework from *Design for belonging: How to build inclusion and collaboration in your communities*, by S. Wise, 2022, Ten Speed Press. Designed by Samantha Wischmeyer, 2024.

Investigative Framework

The investigative model for this research uses the feminist systems change framework. *Feminist systems change* is a way to address and work through systems using a feminist lens (Fraser & Sinha, 2021). Fraser and Sinha write, “Many systemic issues are gendered and these issues, like gender based violence, the feminization of poverty, are far too often minimized, erased and overlooked. We know women are often on the front lines of harmful systems, and therefore, these women have solutions and visions for change” (2021, p. 4). Systems change involves appreciating relationships, adding care to systems, allowing for paradoxes or ideas and people outside of the dominant culture, an awareness of where we fall inside the system, and providing resources to navigate the system (Fraser & Sinha, 2021).

I used the combination of the feminist lens with the systems change to guide my making throughout this research, as seen in Figure 11. The feminist practice lens involves centering care and healing, shifting the power, working across differences, naming the meta systems, and focusing on lived experience (Fraser & Sinha, 2021). The systems practice framework involves learning and adapting, working at multiple levels, deepening relationships, seeing the system, and locating yourself in the system (Fraser & Sinha, 2021). In my making, I chose three feminist practice items and three systems change items to focus on, totaling six, as displayed in Figure 12. In the future, another designer could design for all 10 elements.

Figure 11
Investigative framework diagram

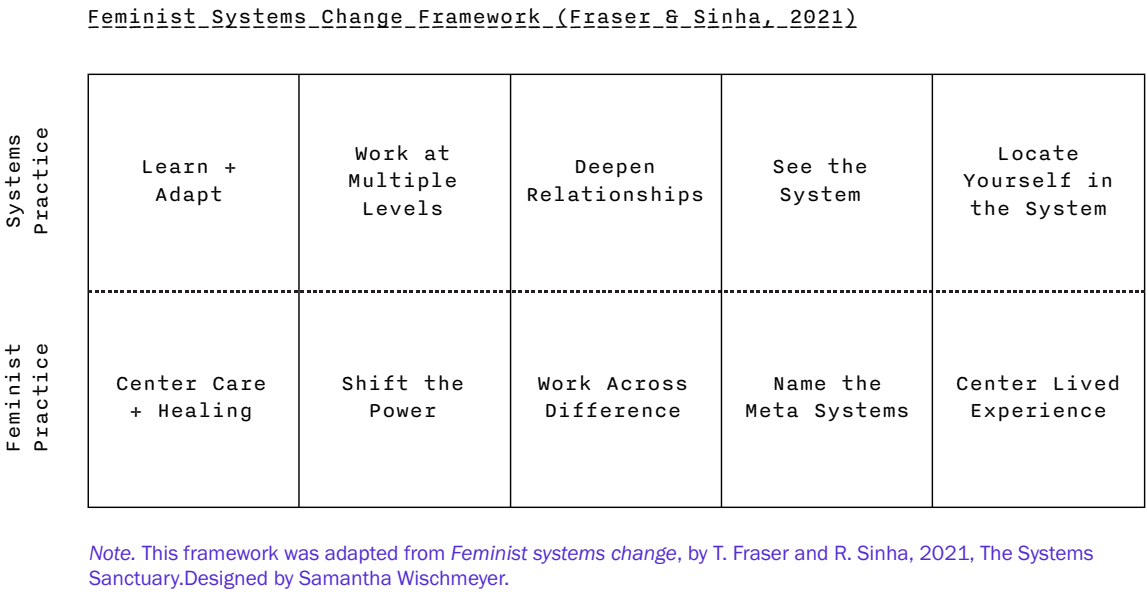
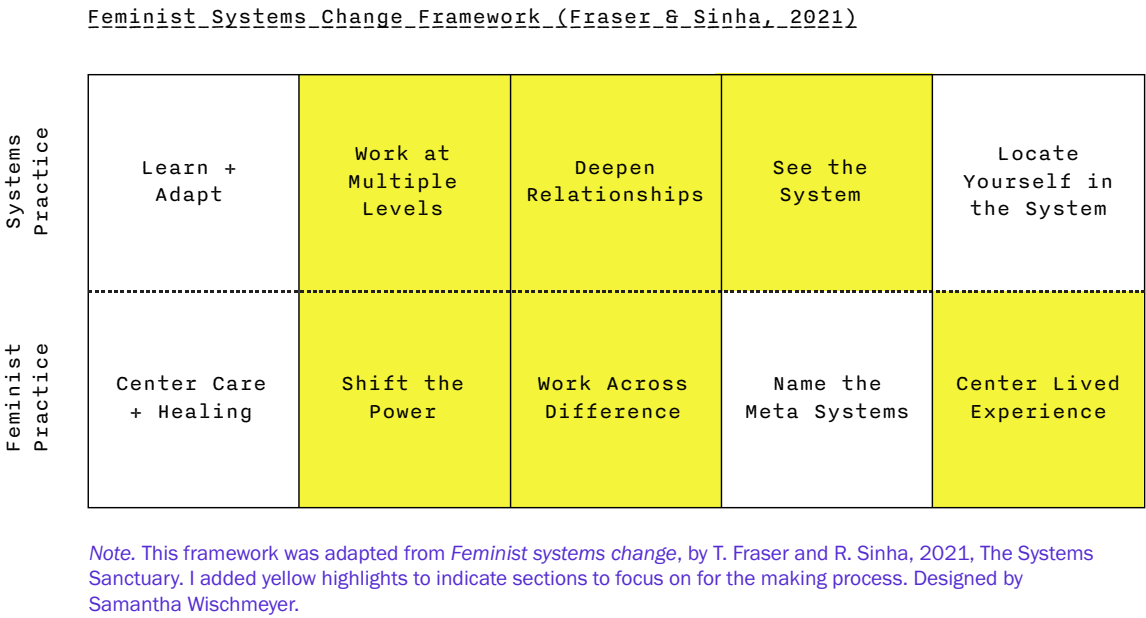
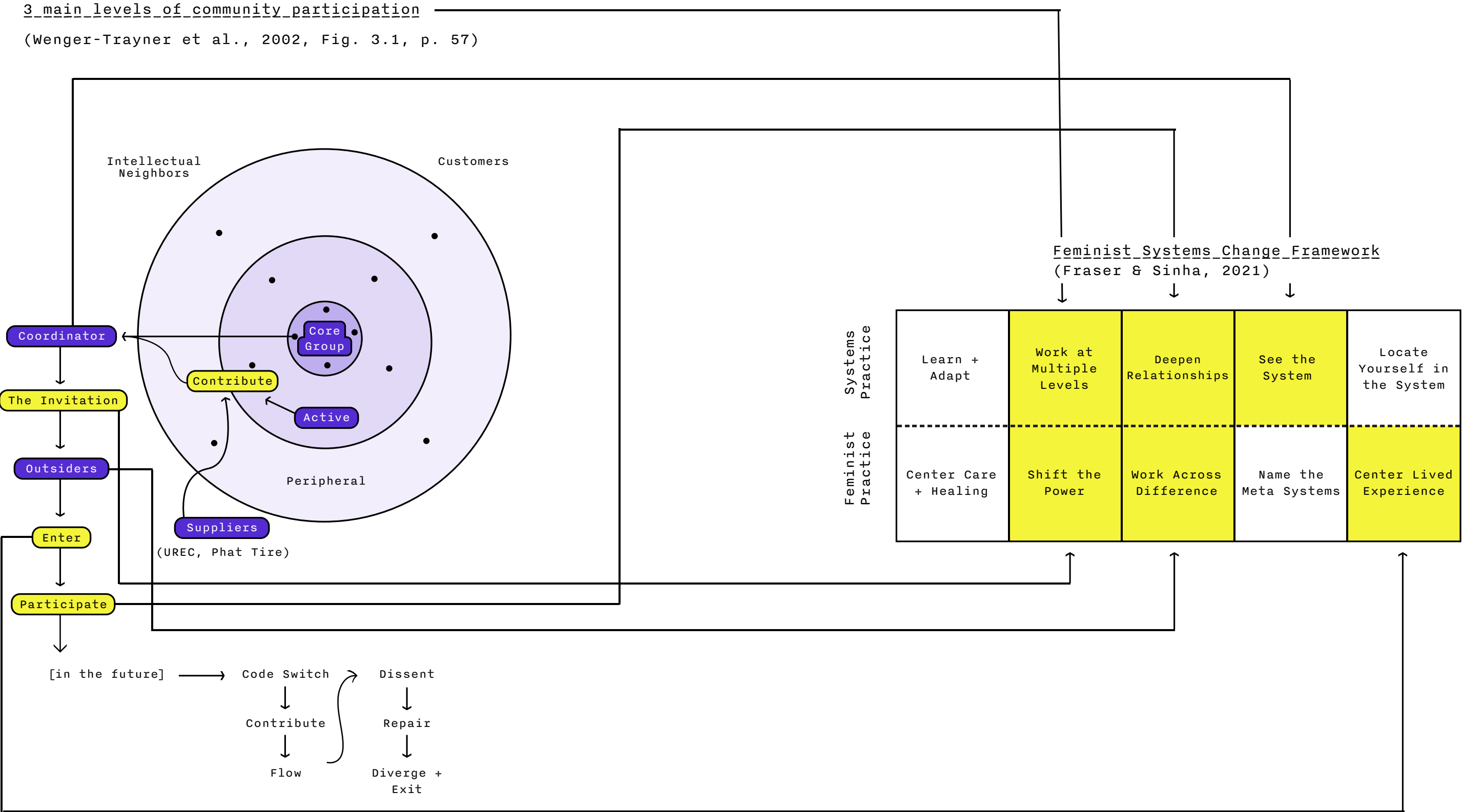


Figure 12
Investigative framework diagram



Lastly, Figure 13 displays how the conceptual and investigative frameworks overlap and complement one another. For example, the coordinator from the main levels of community participation would see and understand the system they are working within (feminist systems change) to be successful in inviting outsiders (those not currently mountain biking) into the sport. Without being able to visualize the system, the coordinator would be unable to work within the system in a feminist manner. The three main levels of community participation involve working with, accepting, and encouraging multiple levels of skill and dedication to mountain biking (Wenger-Trayner et al., 2002). Additionally, when riders enter the space of mountain biking, ideally, the community will help center their lived experience through acts such as pronoun sharing. Outsiders would work across difference with other beginners or with advanced instructors to learn how to ride.

Figure 13
Investigative and conceptual framework diagram



Note. These frameworks were adapted from *Cultivating communities of practice: A guide to managing knowledge* (pp. 49-64), by E. Wenger-Trayner et al, 2002, Harvard Business School Press, *Design for belonging: How to build inclusion and collaboration in your communities*, by S. Wise, 2022, Ten Speed Press, and *Feminist systems change*, by T. Fraser and R. Sinha, 2021, The Systems Sanctuary. Designed by Samantha Wischmeyer.

Design Principles

During the process of researching feminist theory, I delved into feminist manifestos, design principles, and guidelines for moving in a feminist manner from Dori Tunstall's "Seven Principles of Designing Conditions for Community Self-Determination," Shulamit Reinharz' "10 Tenets of Feminist Research," and Victor G. Martinez' students' "Women's Principles for Design" (Martinez, 2023; Reinharz, 1992; Tunstall, 2017). I crafted my own design principles, with the aim of empowering the women mountain biking community and making them feel integral to the research process.

Sam's Feminist Design Principles

1. Build intentional and equitable communities (and sustain them).
2. Share knowledge freely (and often).
3. Open dialogue about power dynamics (and design artifacts to challenge them).
4. Consider collective experience and individual experience (value and design for both).
5. Value practicality and accessibility over innovation (move slowly and help fix things).
6. Envision a possible future (and work towards it).

I centered this research around creating and sustaining an equitable community in mountain biking. I aimed to create principles for a feminist space that existed in perpetuity, outlasting this research. Knowledge-sharing is a sustainable feminist practice that does not require any technology or training. From storytelling, sharing data, or simply giving another rider a helpful tip, knowledge-sharing is an equitable practice that can also form relationships and community. Knowledge-sharing can be a conversation, a dialogue. Change begins with a conversation. An open conversation about power dynamics can be the start of a design.

When designing for communities, I was interested in the group experience, but also the individual experience. For belonging to be successful, a designer must account for both. The community and the individual are valuable and deserve dignity. Many have heard the Silicon Valley phrase, "Move fast and break things." Moving fast leaves little time for conversations and considerations regarding the effects of innovation on the group and the individual. I wanted to create something the women mountain biking community could easily incorporate into their routine, rather than an inaccessible piece of innovative technology. Lastly, throughout this project, I envisioned how an anti-hierarchical mountain biking experience would feel and look. This project was a way to work towards that possible future.

III.

Findings

“**People participate in communities for different reasons**—some because the community directly provides value, some for the **personal connection**, and others for the opportunity to improve their skills” (Wenger-Trayner et al., 2002, p. 55)

Key Findings

I compiled and coded data from 99 survey respondents, 10 individual interviews, one expert interview, and a content analysis to produce these research findings. The main themes that emerged were ideas to engage women in mountain biking, the importance of community, the benefits and barriers of mountain biking, and gendered experiences and systems that affect women’s experiences in the sport.

Interventions

Research participants suggested ideas on engaging more women in mountain biking, which could be potential design intervention ideas. Programming for beginners, including ride groups and workshops, was the most cited intervention for increasing engagement for women looking to mountain bike. Eighty-one percent of women interested in mountain biking requested an introductory group class to help them start riding. Suggestions for the group class included:

1. Keeping the group small at 10 maximum participants.
2. Creating a low-pressure, inclusive, and supportive environment.
3. Learning about gear, safety, and bike maintenance.
4. Creating a women-specific class.

An additional 63% of current riders agreed that an introductory group class would engage more women in mountain biking. Fifty-eight percent of current mountain bikers said they would have benefited from an introductory group class when they began riding. These riders suggested that the class provide bikes for participants for free, create a safe teaching environment, and hold rides at flexible times. Furthermore, 12% of participants stated they would have benefited from an off-bike educational program to discuss bike maintenance, trail etiquette, and which trails suit beginners.

Some participants discussed that there is a subtle cultural shift needed to engage more women in mountain biking. One participant wrote, “I think it takes one person taking someone by the hand.” The encouragement of one person can go a long way in a sense of belonging. Another participant discussed a cultural shift in how mountain biking is packaged and marketed, writing, “Redefine it. Mountain biking isn’t as extreme as it can sound or look.” Some women look at races such as the Red Bull Rampage and think mountain biking is too extreme for them. These participants called for a more personal approach to mountain biking which accepts riding at all levels.

Community

When looking at the coded data and the wide range of experiences, interests, and preferences in the mountain biking culture, it is clear that this community is pluralistic in nature. Women ride for various reasons and receive a wide variety of benefits. While some ride primarily for exercise, many ride for the social and community aspects. Some want a fun activity to do with their family, and some are training for races. All are welcome. While there can be elitism in the Bentonville, AR mountain biking scene, many community advocacy organizations are looking to lower the barriers of entry and include a more diverse pool of participants in the sport. There is, however, some debate as to whether the mountain biking community is inclusive or exclusive. While mountain biking as a sport tends to be more welcoming to newcomers than other comparable extreme sports, these experiences will be vastly different based on positionalities such as race, ethnicity, gender, class, and sexual orientation (McCormack, 2017).

The mountain biking community in Northwest Arkansas is highly social, with 66% of respondents reporting they socialize with their ride group off the trail. One respondent wished there was a resource to find community, writing, “We haven’t found a group yet. I wish there was a way to find groups of bikers of all levels to join one. If there is such a resource, it’s unknown to me.” Though the community is highly active, some still have not found their entry point. Examples of the way women mountain bikers socialized with

their ride groups were through post-ride beers, tacos, trivia nights, craft nights, parades, watching races, and retreats. While the mountain biking community is highly active socially, there is still a need for more intentionally designed spaces for women. One participant wrote, “There are a lot of women that ride in NWA, but it doesn’t necessarily make it easier to find women to ride with regularly.” While more women ride in Northwest Arkansas than in other areas, according to participants, many women still have trouble finding and connecting with a community in this sport.

On the flip side, a significant number of women prefer riding alone, at 36 instances. This phenomenon surprised me since many people warned me when I started against the dangers of riding alone for bike safety reasons, and I do not often see women riding alone on trails in my own experience. Some women discussed how they prefer to ride alone because they feel pressured to go at a certain speed when riding with a group. Again, the fact that some women seek community and some prefer to ride alone is characteristic of the mountain biking community. Each rider has different reasons for riding and interests within the sport.

Findings from the content analysis regarding the digital mountain biking subculture again displayed a highly active cycling community that participates in co-ed group rides, social activities, trail maintenance, and advocacy. The content analysis, primarily of Instagram, showed the importance of ride buddies in the mountain biking culture through memes of one ride buddy being sad when the other skips a ride. The mountain biking culture highly prizes the camaraderie of the rider-to-rider relationship.

Benefits

As established in the justification, mountain biking has many physical, social, and community benefits for participants. Study participants indicated improved physical health at 115 occurrences, closely followed by mental health at 103. The most cited advantages of mountain biking from survey participants were a rise in mood, increased mental well-being, a reduction in stress, and feelings of empowerment. In other words, participants gained multiple crucial mental health improvements from mountain biking and a sense of

empowerment. Mountain biking is a pluralistic sport where participants gain a multitude of benefits. Finally, when participating in this sport, riders acquired significant social benefits, including increased community connections and expansion of friend groups.

Barriers

The two most significant barriers to entry to mountain biking for people interested in the sport were not having a mountain bike and not knowing the technique. The largest overall barrier to entry (from those interested in and currently mountain biking) was a lack of knowledge about mountain biking, including which trails to ride based on skill level, bike maintenance, safety gear, and proper riding form. The second largest overall barrier to mountain biking was cost, with high prices for mountain bikes and necessary gear. Sixty-five percent of respondents interested in mountain biking cited not having a mountain bike and not knowing the technique as the main barriers to entry into the sport. Additionally, 47% of respondents interested in mountain biking cited not having anyone to teach them how to ride as a barrier. The finding that almost half of the participants did not have someone to teach them to ride indicates a gap in mentorship among women riders.

The top barriers identified in the content analysis were a type of competitiveness I call an “adrenaline show” and the rise of materialism in the mountain biking culture. The adrenaline show appeared repeatedly on Instagram posts, primarily of men posting their extreme-looking first-person point-of-view downhill mountain biking footage. While it is not necessarily wrong to post footage like this, the culture tends to reward showing a high level of risk, which adds to the idea that mountain biking is excessively extreme, and if you are not riding with a high degree of risk and speed, then you are not a mountain biker. The perpetuation of risk aesthetics in the mountain biking culture adds to why some women feel uncomfortable joining the sport: they see adrenaline show posts like these on trails so extreme they would never attempt them and think that is all mountain biking is.

The rise of materialism in mountain biking culture was another factor that repeatedly appeared on social media posts. Riders posted about how expensive their gear and bikes were, as if expensive gear were the norm among this group. Again, it is not wrong to post about one's expensive gear. However, it makes some feel they will be excluded from the dominant culture if they do not have the best name-brand gear.

Gender

Gender affected women's participation subtly and overtly in this research, from sexist societal systems to the way the media packages mountain biking as a sport so extreme that women cannot see themselves participating. As discussed in the literature review, women are less likely than men to learn mountain biking at a young age (Roberts et al., 2018). Only 10% of all participants in this research learned to mountain bike before the age of 18. With fewer women taught to ride as children, fewer women build confidence in riding at a younger age.

When discussing gendered experiences in mountain biking with expert interviewee Anya Bruhin, she discussed how the dominant culture has set up societal systems that disadvantage women. Bruhin stated, "The societal model is that men do the extreme thing and women do the demure thing." She elaborated that society favors risk-taking behaviors in men while creating an expectation that women need to protect themselves to take care of their current or potential future children.

Other women riders who were also mothers discussed a similar phenomenon. One participant noted, "After I had my first kid...Now if I get hurt, it's not just impacting me. It's impacting this other tiny human that I'm supposed to be keeping alive." She discussed how her willingness to take risks in sports and life changed after having children. Additionally, participants discussed how there is an extra layer of expectation on mothers rather than fathers (in heterosexual parenting couples) regarding leisure activities. One participant stated, "There's the whole mom guilt thing where I'm doing something for myself and it feels selfish." Her feelings of selfishness at times kept her from riding.

Interview and survey participants mentioned lack of childcare as a barrier 16 times during this research process. Some recommended that trailside childcare would help them be able to ride more. This data points to a more expansive issue of the lack of childcare in the U.S., which burdens primarily mothers. Additionally, men were more likely to teach women to mountain bike than other women or non-binary people. This research is also consistent with data from the literature review and may add to a gendered power dynamic in the mountain biking subculture.

Data Visualization

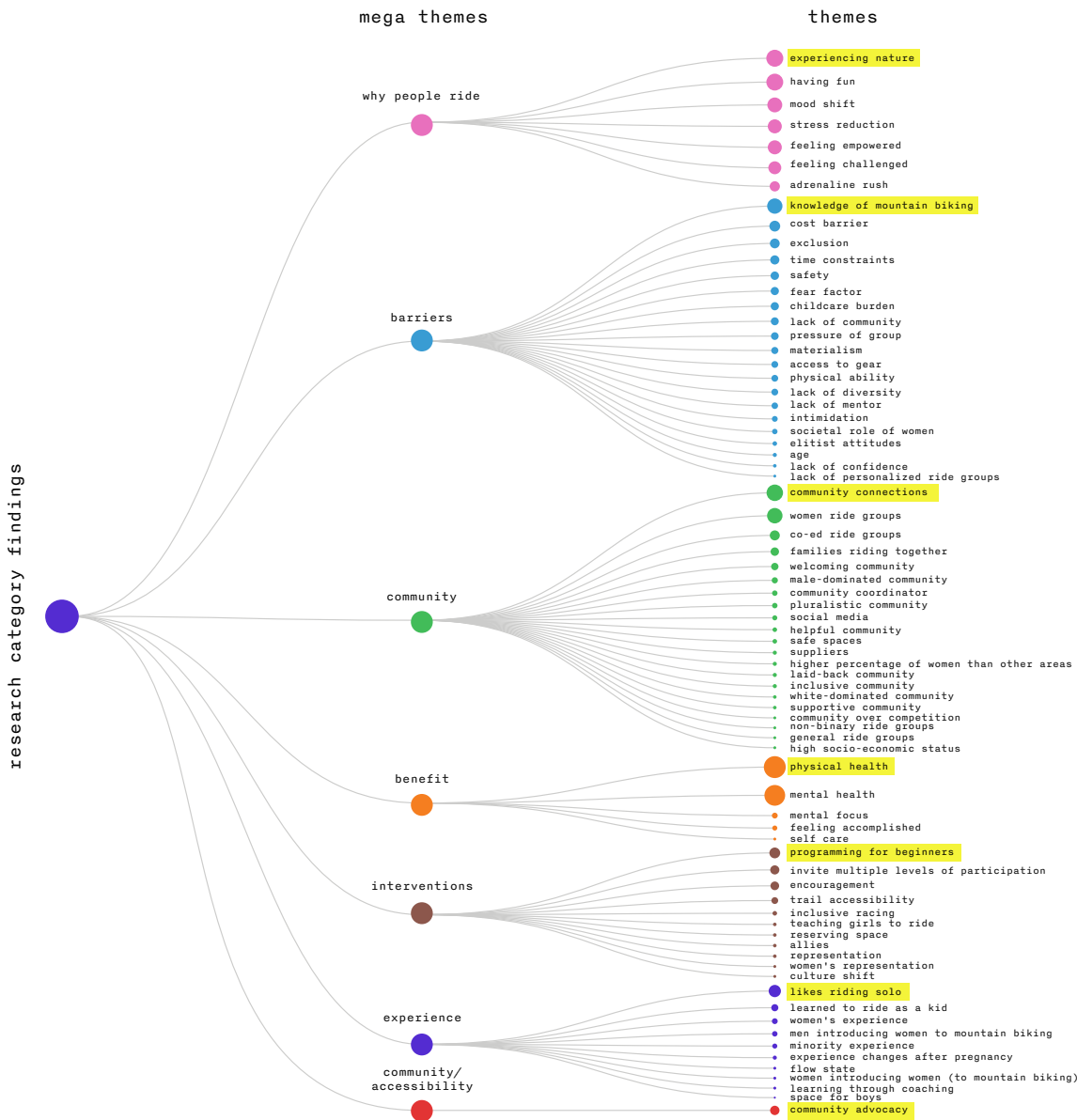
The data visualization below represents the top categories of instances within the themes and mega themes of the coded data. Figure 14 displays the main themes and mega themes from the research category findings. The top themes included positive experiences in nature, the mountain biking knowledge gap, increased community connections, improvements in physical fitness, programming for beginners, preferences for riding solo, and community advocacy.

Figure 15 displays the number of times the mega themes appeared during the research coding process. People discussed why they rode the most and community and accessibility the least. This discussion does not mean that any are more significant than others based on how many times they appeared.

Conclusion/ What Surprised Me

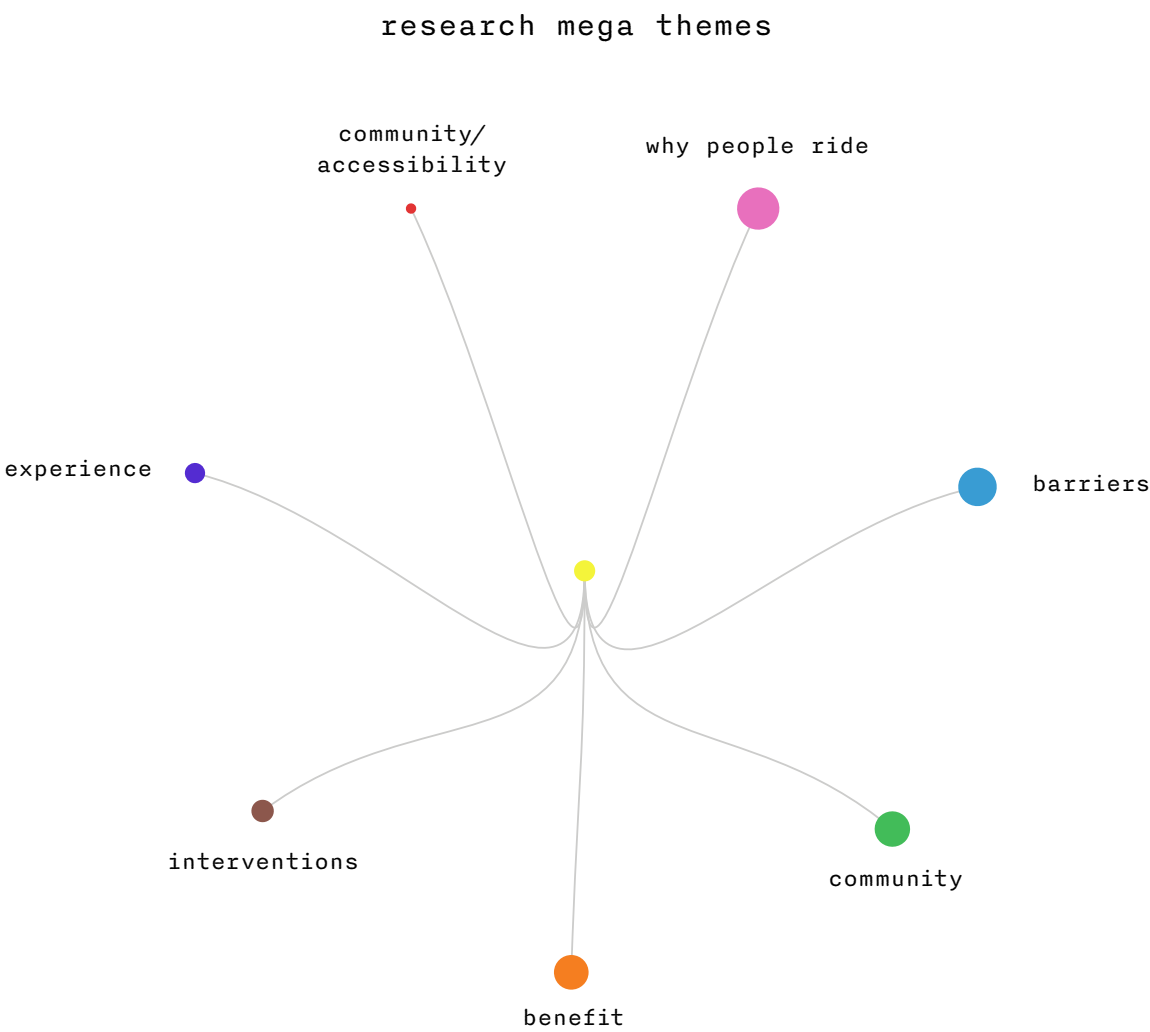
An assumption I had going into this research was that participants would primarily be discussing gendered experiences concerning the hegemonic white male mountain biking community and how the dominant community made them feel othered. However, the findings were vastly more plural and intersectional. Participants discussed the lack of childcare systems to support parents and guardians, the exorbitantly high-cost barrier of mountain biking, and the lack of community for women who ride, even in an area with a seemingly higher percentage of women riders, as multiple participants noted.

Figure 14
Data visualization chart of themes and mega themes



Note. This chart represents a data visualization of the themes and mega themes from the data coding process. The top occurring phenomenon from each mega theme has a highlight. Greater size correlates with a greater number of instances. Designed by Samantha Wischmeyer, 2024.

Figure 15
Data visualization chart of mega themes



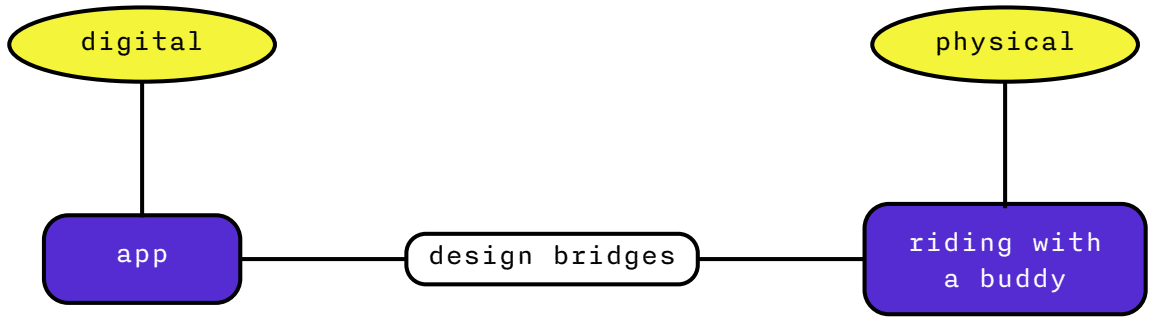
Note. This chart represents a data visualization of the mega themes from the data coding process. Greater size correlates with a greater number of instances. Designed by Samantha Wischmeyer, 2024.

Studies

Meredith Davis discusses how designers can create a bridge between digital and physical experiences for users through design intervention. Davis writes, “Today’s digital experiences, therefore, are embedded within larger activities through which people interact with their social and physical world...It is in the gaps between online and offline environments, between devices, and between related service providers that users often lose support” (Davis, 2018, p. 2). By addressing the gaps in service between offline and online environments, I propose one primary physical and one digital deliverable for this project. The physical deliverable is a feminist beginner mountain bike workshop and the digital deliverable is an app for women to find mountain biking ride buddies. Figure 16 displays how design would bridge the gap between downloading an app (digital experience) and riding with a buddy (physical experience).

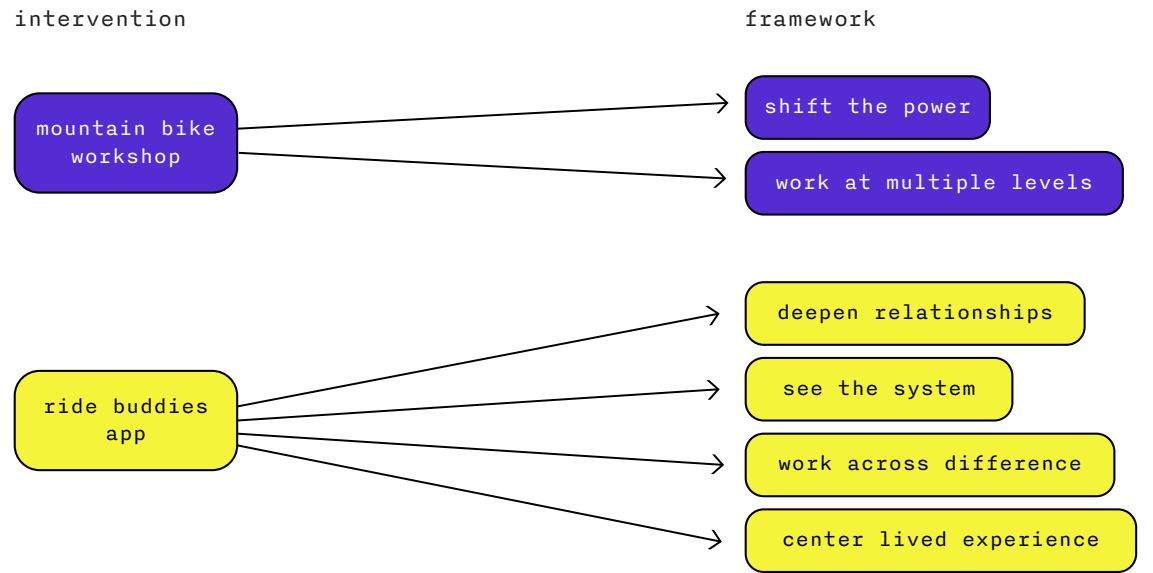
Figure 17 displays how the two primary interventions overlap with the principles of the feminist systems change framework from Fraser and Sinha and how the interventions address the six key points. The mountain biking workshop addresses shifting power and working at multiple levels. The ride app addresses the primary points of deepening relationships, seeing the system, working across difference, and centering lived experience.

Figure 16
Bridging digital physical experiences diagram



Note. This framework was adapted from *Bridging digital and physical experiences*, by M. Davis, 2018, AIGA: The Professional Association for Design. Designed by Samantha Wischmeyer.

Figure 17
Design intervention conceptual framework



Note. This framework was adapted from *Feminist systems change*, by T. Fraser and R. Sinha, 2021, The Systems Sanctuary. Designed by Samantha Wischmeyer.

Physical Intervention

Group ride workshop

The two key points from the feminist systems change framework that apply to the mountain biking workshop are shifting the power and working at multiple levels. To address a cultural power shift in mountain biking, I designed this workshop for beginner women riders, giving agency and knowledge-sharing to a group that the sport has historically excluded. By inviting and working at multiple levels, this workshop normalized and encouraged riding at any degree of experience or expertise: all levels of mountain biking were accepted and validated. Based on the two most significant barriers to entry for those interested in the sport, not having a mountain bike and not knowing the technique, I addressed these material and educational barriers by providing bikes and instruction for free to participants. Sara Ahmed notes that feminist movements can happen on a large or small scale (2017). Based on participant feedback suggesting small group workshops, I limited participation to no more than six participants to create feminist movement in a small way. Ahmed writes, “To bring feminist theory home is to make feminism work in the places we live, the places we work,” and I would add the places we hang out (2017, p. 10). Although mountain biking is a leisure activity, it still impacts the lives and experiences of participants, as seen from the research findings. One can bring feminist theory into extreme sports in grand or modest ways. Inviting a group of women to learn how to mountain bike is, although small, a feminist act. Ahmed’s main tenets of how to live a feminist life include not necessarily adhering to a set of practices or beliefs, questioning ethics, creating relationships, supporting those without support, and dealing with an unjust history (2017), tenets which shaped the design of this workshop and this project on a larger scale.

I facilitated a beginner mountain bike workshop for women interested in learning to ride. I used my research funds to hire two certified mountain bike instructors and rented bikes for participants from the University Recreation (UREC) Bike Shop. To find participants, I contacted survey participants interested in programming related to this research, put up

fliers, and posted an article in the University of Arkansas Newswire. See Appendix D for marketing materials.

I utilized the workshop method to user-test design interventions and measure how they address the needs of the participants. The introductory group ride taught new and beginner riders how to mountain bike. I intentionally designed every step to be instructive and address the key points of shifting the power and working at multiple levels. Examples of shifting the power included pronoun sharing and asking the participants what they hoped to get out of the class rather than assuming why they showed up. Inviting certified coaches to teach beginners addresses working at multiple levels because advanced riders taught beginner riders. Additionally, riders showed up with varying levels of experience. Two had ridden on an off-road trail before and the other three had not. Working at multiple levels can benefit the entire group by adding new and unique perspectives to a learning environment. Furthermore, the post-ride survey addressed shifting the power by giving agency to the participants to give anonymous feedback about how I could improve the workshop for the future. See Appendix D for the complete workshop itinerary.

A brief description

The weather for the workshop was gorgeous: 70s and sunny with a nice breeze. Two certified instructors taught the class: Lynette Voss, who runs the UREC bike shop and is a Women of Oz ride leader, and Bea Becerra, on the board of All Bikes Welcome, Bike.POC, and Latinas en Bici. Five of the six participants who signed up showed up for the ride. Three participants found this research through Newswire and two were design students I recruited to come (both self-identified women who had not mountain biked before). Lynette sized participants for mountain bikes while I handed out and explained consent forms. We all went around in a circle, sharing pronouns, names, and what everyone hoped to get out of the experience. Lynette discussed air, brake, chain (ABCs), proper helmet use, and mountain biking knowledge. Her one rule was No Apologizing.

We began by working on mountain biking fundamentals. Bea taught the participants level pedals, ready position, and bike-body separation and cornering. Bea stated the skill, and I demonstrated how it looked. Lynette worked one-on-one with a participant on riding skills. The combination of group instruction and one-on-one instruction was quite successful, with the rider gaining confidence in a short amount of time. Lastly, Lynette led the group with Bea at the back on the way to the Tsa La Gi bike park, where participants tried their first trail. They sessioned⁶ the beginner green cross-country trail while I rode with a beginner rider on a paved trail. We then rode back to the UREC and briefly discussed what the participants were proud of themselves for that day. Figures 18-25 display photos from the event.

⁶ “Sessioning” is a word mountain bikers use to describe riding a trail multiple times in a row to gain confidence.

Figure 18
Mountain biking workshop



Note. Lynette discussed trail etiquette at the beginning of the workshop. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 19
Mountain biking workshop



Note. Instructor Lynette discussed proper tire pressure levels with a participant. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 20
Mountain biking workshop



Note. The group on the way to a grassy patch of land. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 21
Mountain biking workshop



Note. Instructor Bea demonstrated mountain biking techniques for participants. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 22
Mountain biking workshop



Note. Instructor Bea and a participant practiced mountain biking positions. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 23
Mountain biking workshop



Note. Riders practiced their new skills on the grass before trying them on a trail. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 24
Mountain biking workshop



Note. Instructor Lynette gave the participants tips before they tried their first mountain biking trail. This photo was taken by Samantha Wischmeyer with participant consent.

Figure 25
Mountain biking workshop



Note. The group lined up to begin their first trail. This photo was taken by Samantha Wischmeyer with participant consent.

Participant Quotes “I was scared to even come to the workshop and almost didn’t come but the environment was very welcoming and the facilitators prepped us well with the drills...It was more empowering than I expected.” – Workshop Participant

“I’ve never mountain biked before at all, so I was really impressed at how many new skills I was able to learn in such a short session. The environment made me feel safe and empowered. I also loved the passion I felt from the instructors!” – Workshop Participant

“The technical discussions and drills helped me understand MTB better. This workshop helped to lower my intimidation regarding mtb [mountain biking]. Nice to be with women beginners. Bikes provided were great!!!” – Workshop Participant

“I think this experience has empowered me to try new things and embrace new challenges.” – Workshop Participant

Post-Ride
Survey Results

Feedback from the workshop was overwhelmingly positive. Based on the data, riders felt satisfied, supported, and comfortable during the workshop. Additionally, all riders felt a confidence boost in their skill level after participating. Some suggestions for improving the workshop in the future included adding time for snack breaks, beginning with an instructional video, and not going over the proposed ending time. One survey participant who also attended the workshop stated, “I’ve never really considered it [mountain biking] until this study, but mountain biking is something I’d like to try at least once.” I was excited that this research created an opportunity for someone to try riding who had never considered it before. I believe this further exemplifies how, when given the chance, more women may be interested in mountain biking than are currently riding. See Appendix E for full post-ride survey results.

From my perspective

Overall, the workshop was a success. It generated interest in mountain biking among riders and gave them a space to try out the sport without the cost burden, without judgment, and with the comfort of trained professionals leading the charge. Although it went well, I would make some changes in the future:

- 1. Having a third party document the event with photos. It was challenging to facilitate the workshop, assist with demonstrations, and take photos of the event.
- 2. Extending the workshop by an hour based on participant feedback to allow longer breaks for participants and ride leaders.
- 3. Adding a section at the beginning with instructional videos, based on feedback from workshop participants.
- 4. Making the workshop into a series in which skills would build over time.

Digital Intervention

Digital app

To facilitate interactions among women mountain bikers and address the lack of resources they have to form community, I designed an app for women riders of all levels to find other women with whom to ride. This app is a digital intervention called Ride Buddies that aims to foster agency for women to share knowledge and create deep and lasting relationships. The app addresses the feminist systems change points of deepening relationships, seeing the system, working across difference, and centering lived experience. This speculative app design is not a fitness app. The design of Ride Buddies aims to foster a community of women mountain bikers who will interact digitally and eventually meet in person to ride, bridging the gap between digital and physical communities (Davis, 2018).

There are currently no apps available for cyclists to find riding partners, though two existed in the past. However, neither is functional anymore. Based on the precedent of apps for dating, friendship, and exercise, this app caters to a fully customizable experience of meeting new people through the shared love of off road cycling.

Case studies

Peanut
Peanut is an app for women who are mothers or looking to become mothers. It allows users to connect, support each other, make friendships, and share information on raising a child. Users create profiles based on their interests. Users have the option to join community groups about various topics and swipe to find friends to connect with, similar to dating apps such as Tinder or Bumble.

The app design is modern and minimalist. It has a dark gray background with pops of pink on the buttons and text. The app is very legible and easy to navigate. The design elements guiding my design are suggested groups and your life stage. The suggested groups feature allows users to join groups based on various topics and interests or create their own. Suggested groups are a way for mom communities to support one another and share information. The “your life stage”

feature allows users to choose their stage in the motherhood journey. The options are trying to conceive, Mama-to-be, Mama, and Menopause. Rather than just designing an app for current mothers, Peanut connects users trying to become pregnant to women who have completed their pregnancy journey and are in a later stage of life. This feature invites multiple levels of participation and is pluralistic.

Bumble
Bumble is a dating app with features for friendship and business connections. I used the “BFF mode” feature to guide the design of the app. BFF mode is for users who want to make friends. Users make profiles and choose their interests and gender preferences for BFFs. This mode has a swipe feature to match with new BFFs.

The Bumble design is amiable, inviting, and simple. It has a yellow background, and the buttons are primarily white. The design elements guiding my design are the BFF filter, community guidelines, and your interests. Bumble is highly customizable. There are many ways a user can express themselves in this app through the many preference and interest options. It is not a “one size fits all” dating app. On the BFF filter, users can choose the age range of friends they are looking for and how far away they are. Additionally, Bumble has users sign a community guidelines pledge to treat people respectfully. The language is accessible and easy to understand. On the “your interests” feature, users can choose a range of interests on their profile to match with friends with similar hobbies, including creativity and fitness.

Strava
Strava is an exercise app cyclists use to track their rides. Users can follow one another to see what kinds of rides their friends are doing. Once users sign up and give Strava access, Strava tracks their rides and gives them speed, heart rate, and elevation statistics. Because users can share trail maps, it is also a way to discover new trails to ride.

Strava’s design is very minimalist and easy to navigate. The background is white, and the buttons have pops of bright orange. The design elements guiding my design are the community groups and chat features. Strava has an option

Personas

allowing users to join group challenges and clubs to connect to the community outside of their circle. Additionally, Strava has a chat feature where users who follow one another can chat within the app.

I created two personas to guide the app creation based on the two main categories of research participants: working mothers and college students. *Personas* are a design research method involving creating an archetypical user based on research (Martin & Hanington, 2019). Using a persona aids a designer in understanding user behavior and creating scenarios to serve the user best (Martin & Hanington, 2019). I created a persona of a working mother named Sylvia (Figure 26) and a college student named Karina (Figure 27).

Sylvia Romero

Sylvia is a mother of three and a full-time grant writer for a non-profit. She has very little time to herself but is interested in beginning an outdoor sport she can do with her kids while also meeting other mothers to ride with. Sylvia has seen families mountain biking together and thought it looked like a fun new way to get outdoors and exercise, but she does not have a bike or know anyone who can show her the ropes.

Karina Parks

Karina is a Junior at the University of Arkansas studying Psychology. She is active and has been riding mountain bikes for 6 months. Although she enjoys mountain biking, she wishes she had friends with whom she could go on rides. Karina is outgoing and would like to be a part of the mountain biking community and meet people that way.

Figure 26
Persona #1: Sylvia Romero

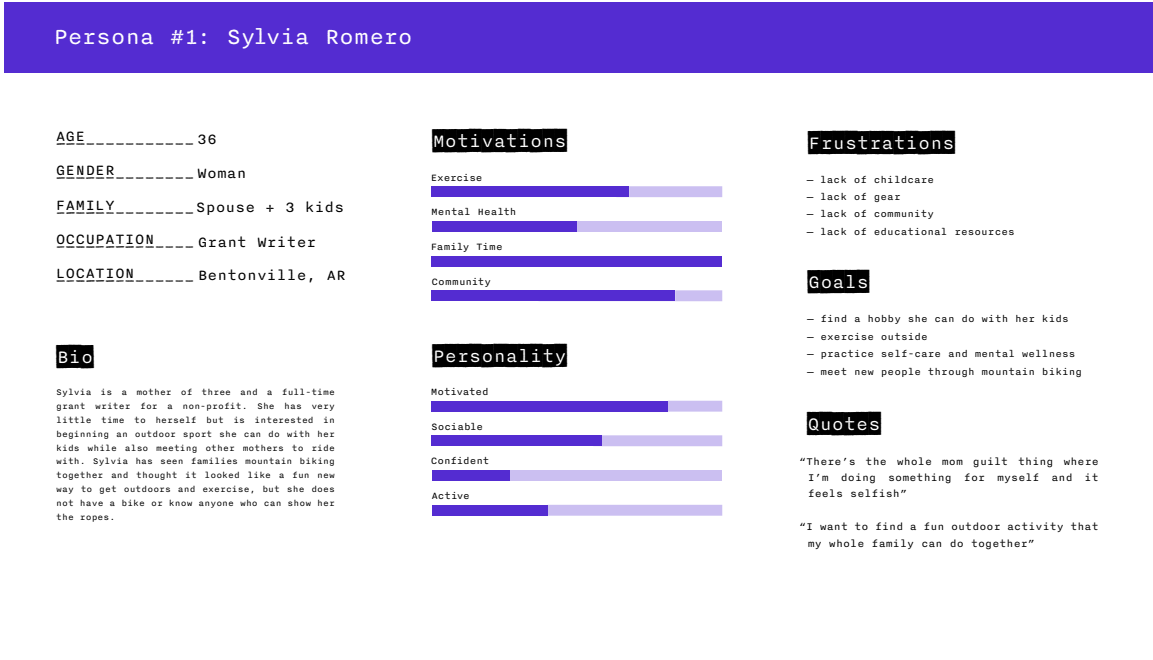
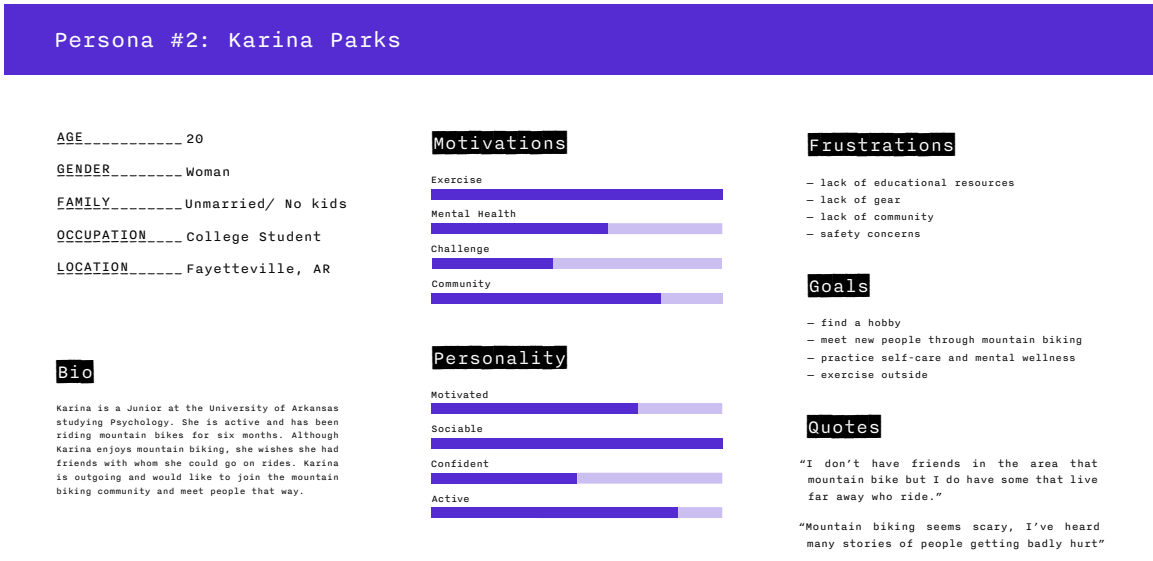


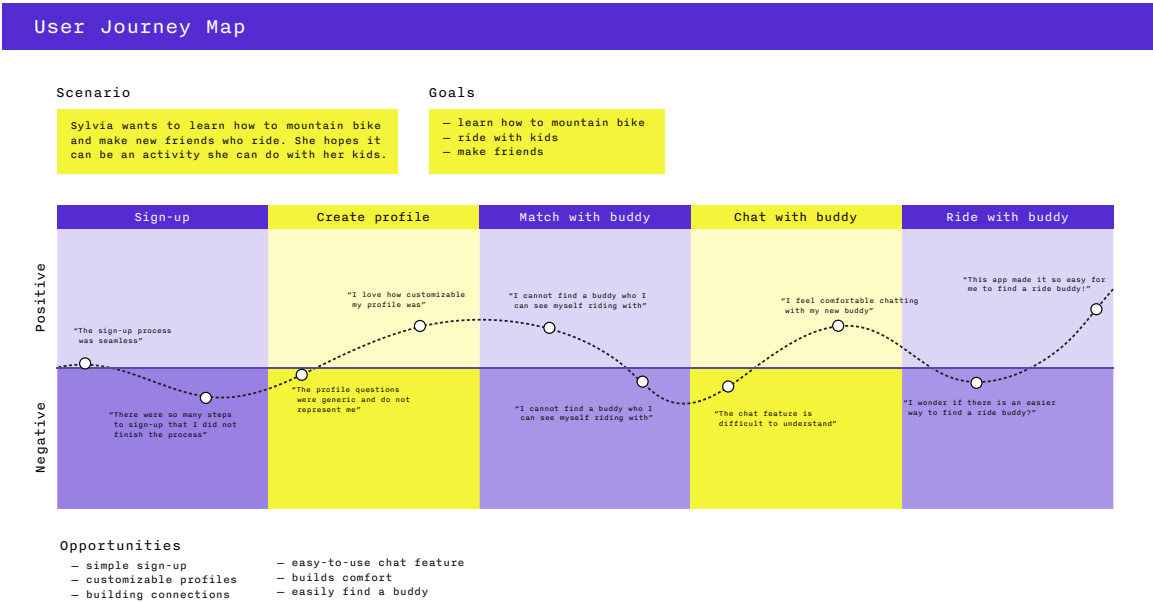
Figure 27
Persona #2: Karina Parks



User journey map

User journey maps are a visual tool designers create to track a user's experience while using a product (Martin & Hanington, 2019). The purpose of journey maps is for a designer to evaluate each step of a user's journey to create an optimum experience (Martin & Hanington, 2019). I created a journey map of how a user might interact with the Ride Buddies app using the persona of Sylvia Romero in Figure 28. In this map, Sylvia goes through the steps of signing up, creating a profile, matching with a potential ride buddy, chatting with the ride buddy, and finally, riding in person with the buddy. Opportunities for creating a peak experience for Sylvia include creating a simple sign-up process, a customizable profile, helping Sylvia build connections, creating a seamless chat feature, building comfort among users, and creating a space in which users can easily find a good match in a fellow ride buddy.

Figure 28
User journey map



The app

Assumptions and Limitations

Ride Buddies is a speculative app which connects women with mountain biking ride partners. Assumptions for this app creation include that riders have access to a smartphone and are interested in mountain biking. Due to time constraints surrounding my investigation, I designed a speculative app. I created six primary features for this app, which directly correlate to the six key points I focused on from the feminist systems change framework: shifting the power, working at multiple levels, deepening relationships, working across difference, centering lived experience, and seeing the system (Fraser & Sinha, 2021). In the future, a designer could fully build out this app and make it fully functional.

App features and justifications

Based on the suggested groups feature from Peanut, I created a community suggested groups feature that addresses shifting the power by giving agency to the user to create their own group and participate in the groups of others. Based on Bumble’s customizable sign-up and extensive preferences options, I designed a highly customized sign-up experience for users to choose their preferences and skill level within mountain biking to address working at multiple levels. Ride Buddies caters to mountain bikers of all levels, encouraging advanced riders to ride with beginners. I created swipe-based interaction, direct messaging, and group chat features based on the swipe-based interaction on Bumble BFF mode and the Strava chat features to address deepening relationships. By providing a space for users to connect and chat, I aim to foster connection and camaraderie among riders. The swipe-based feature does not initially show the rider’s image to reduce bias and create an equitable environment. Instead, the swipe feature displays the rider’s “mountain biking aura.” The mountain biking aura represents the rider’s preferences, skill level, and interests in mountain biking. Once riders “match” with one another, the app reveals the rider photos for safety reasons.

I designed a mentorship and para rider support feature to address working across differences. Mentors are advanced riders willing to teach beginner mountain biking skills. Mentors gain “high-fives” for every ride they bring a beginner on and can then cash the high-fives in at local bike shops

for discounts on gear. Mentors can upload their mountain biking coaching certification during the verification process, but certifications are not required. Para support mentors are certified mountain biking instructors with experience riding with para and adaptive riders. Becoming a para support mentor requires an extensive verification process for the safety and quality of instruction for para riders.

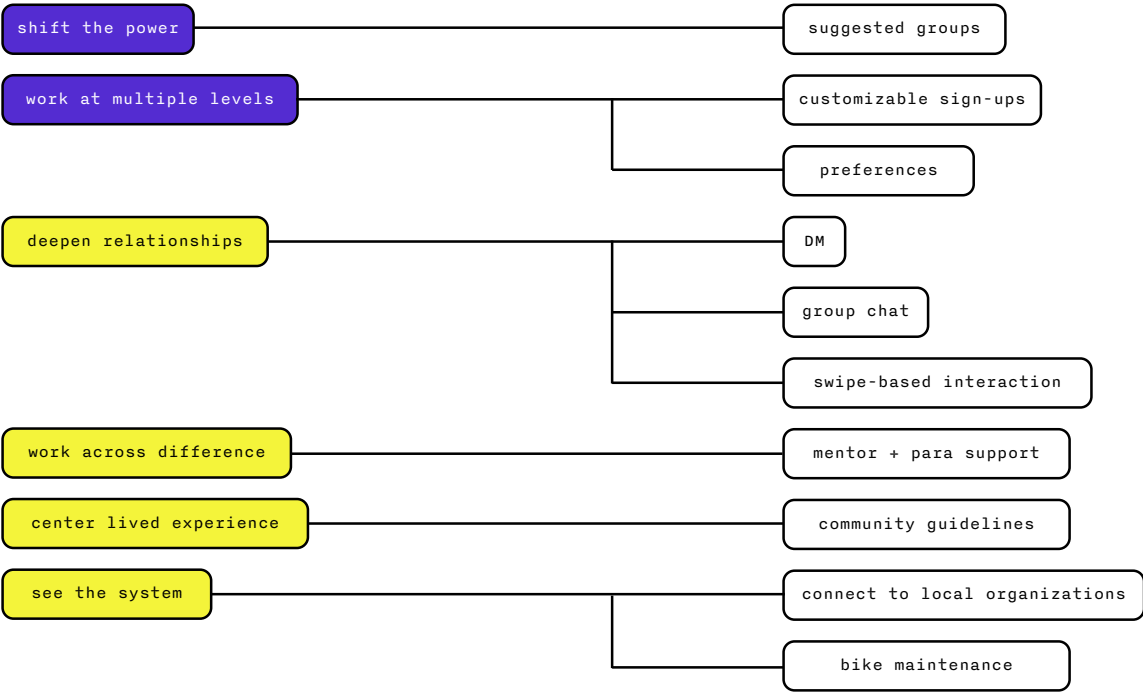
Based on Bumble’s community guidelines feature, I created a simple community guideline that every user must agree with to address centering lived experiences. I aimed to create an equitable environment of belonging by utilizing guidelines of conduct within the app. Finally, based on Strava’s community organizations, I created a feature to connect to local organizations and for bike maintenance to address the knowledge barrier from research participants. These features address seeing the system since they address the local mountain biking systems and the lack of knowledge regarding mountain biking maintenance.

App features and justifications (Figure 29):

- 1. Suggested Groups (Shift the Power)
- 2. Customizable Sign Ups + Preferences (Working at Multiple Levels)
- 3. Direct Messaging, Group Chat, Swipe-Based Interaction (Deepen Relationships)
- 4. Mentor + Para Support Feature (Work Across Difference)
- 5. Community Guidelines (Center Lived Experience)
- 6. Connections to Local Organizations + Bike Maintenance (See the System)

A walk-through of the app flow can be seen in Figures 31-54 and a walk through video of Ride Buddies can be seen at <https://www.youtube.com/channel/UCjCgHyIryRFMaYG566q93Q>.

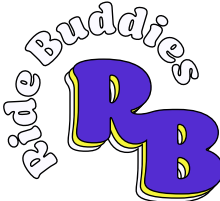
Figure 29
App features conceptual framework



Note. This framework was adapted from *Feminist systems change*, by T. Fraser and R. Sinha, 2021, *The Systems Sanctuary*. Designed by Samantha Wischmeyer.

Branding I branded this app to be friendly, inviting, and legible. I created a textured background with a zine-like feel, representing the laid-back and personal mountain biking culture, as seen in Figure 30. I used the colors Purple Heart, Barberry, and Blue Chalk as a nod to the colors of the women’s suffrage movement (Blakemore, 2021), but with an updated, saturated hue to represent the next generation of the feminist movement.

Figure 30
Ride Buddies branding



Headers

Darker Grotesque Black

Body Copy

Quicksand Medium

60%

30%

10%

buttons

buttons

Purple Heart

Dark Shade 02

#542C2D

rgb(84, 44, 210)

Pantone 266 C

Barberry

Light Shade 01

#F5F53A

rgb(245, 245, 58)

Pantone 394 C

Blue Chalk

Light Shade 01

#FCF8FF

rgb(252, 251, 255)

Pantone 7436 C

headers.

body copy.

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106, Fostering Community

Wischmeyer, 107

Figure 31



Figure 32

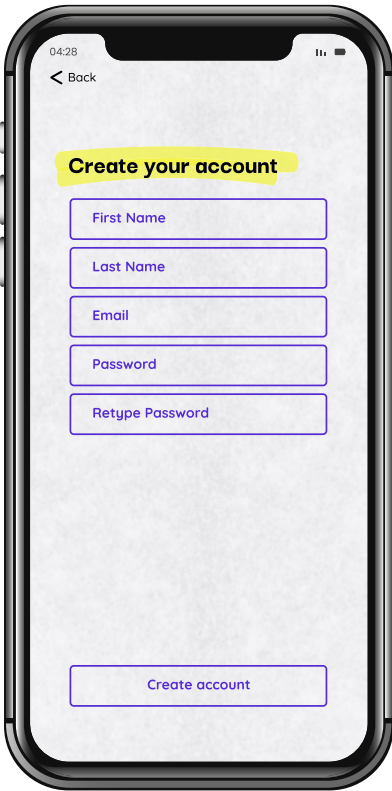


Figure 35

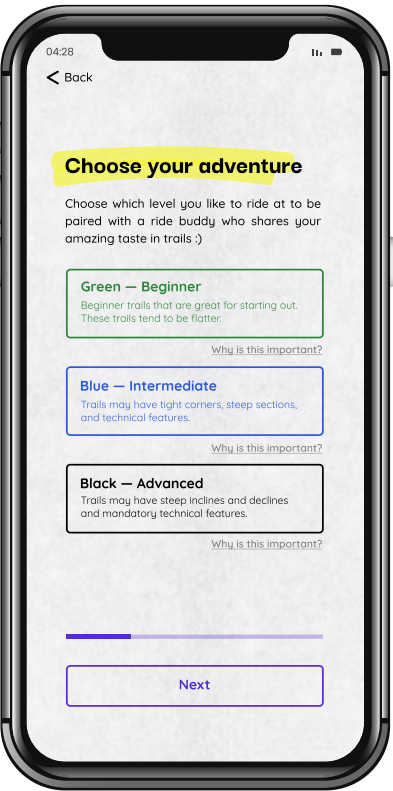


Figure 36

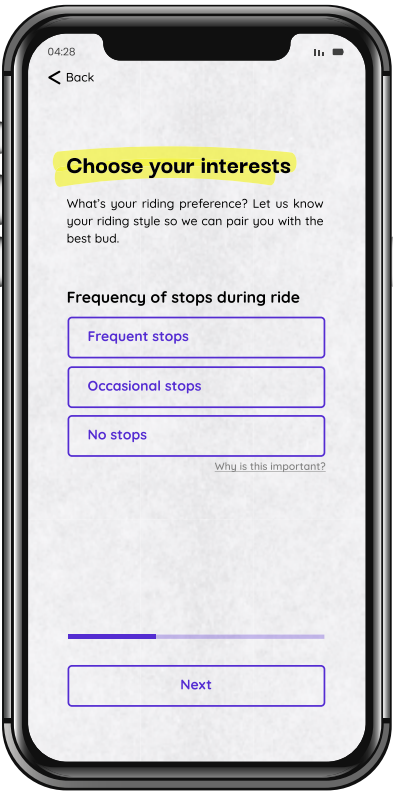


Figure 33



Figure 34

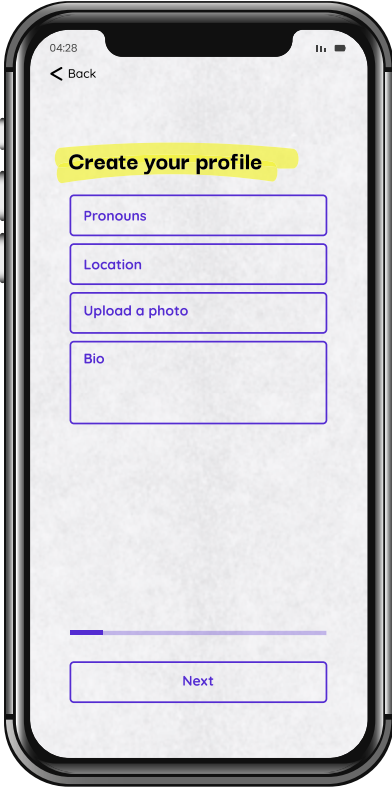


Figure 37

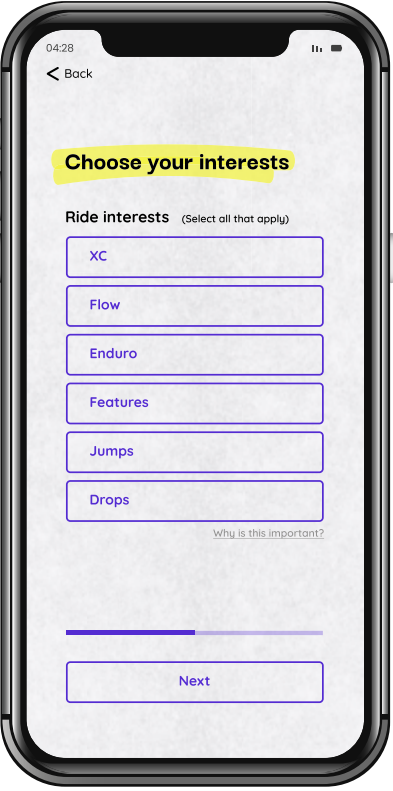


Figure 38



Figure 39

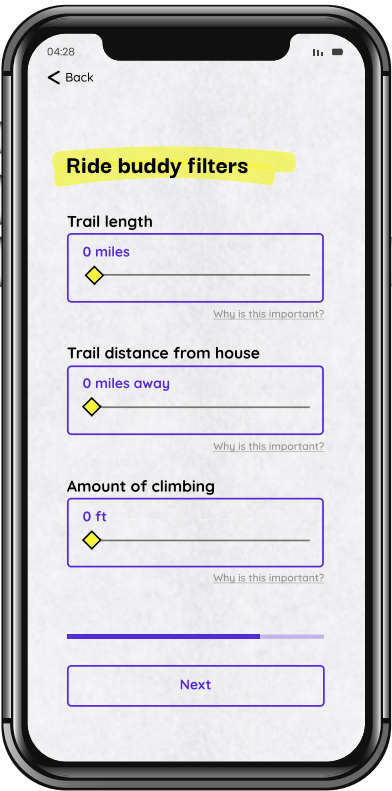


Figure 40

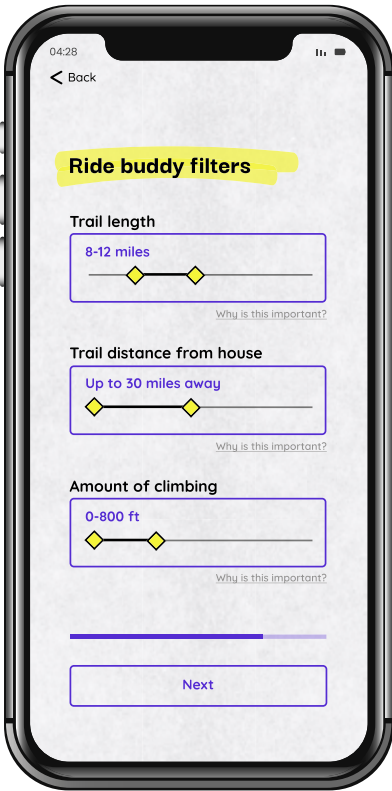


Figure 43

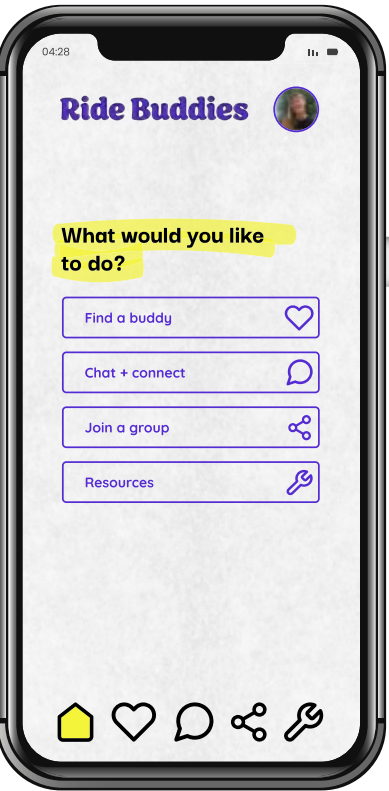


Figure 44

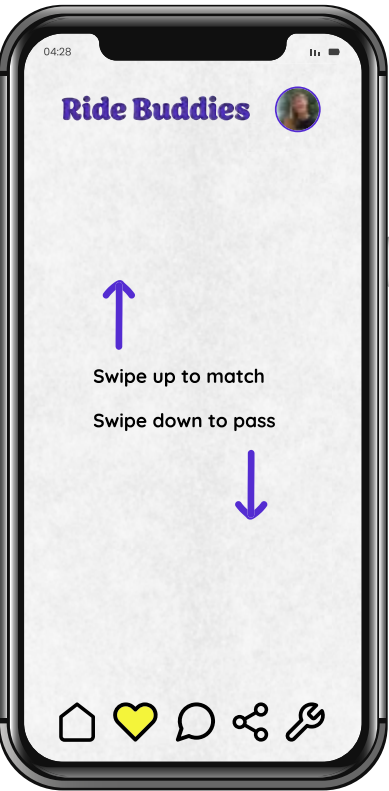


Figure 41

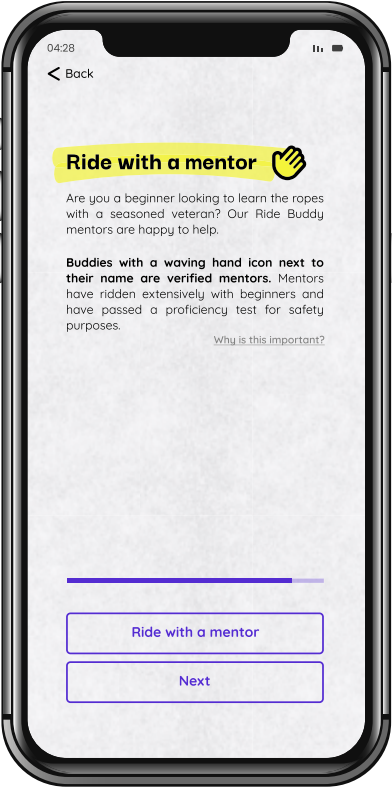


Figure 42

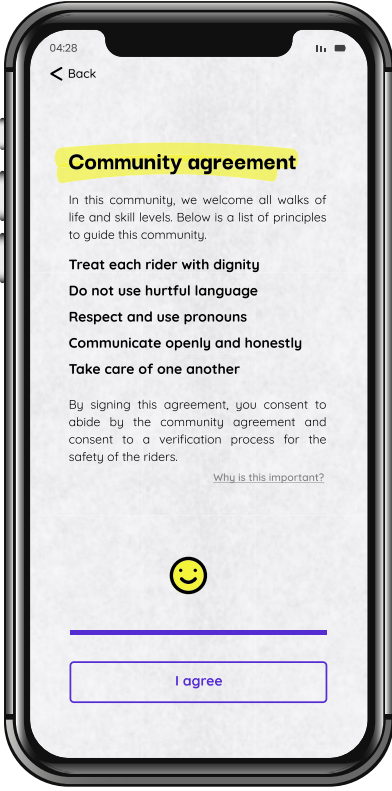


Figure 45



Figure 46

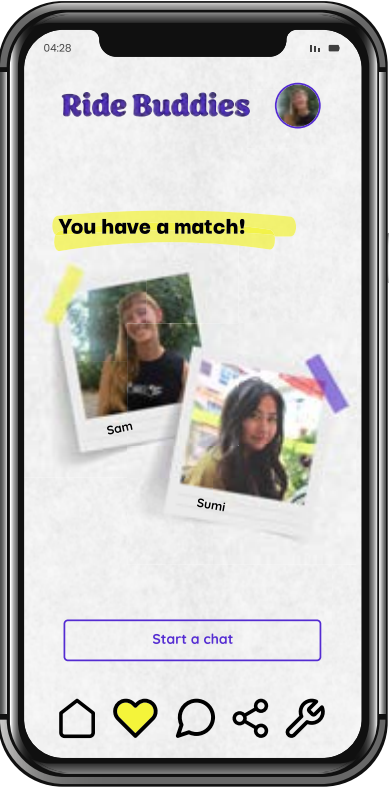


Figure 47

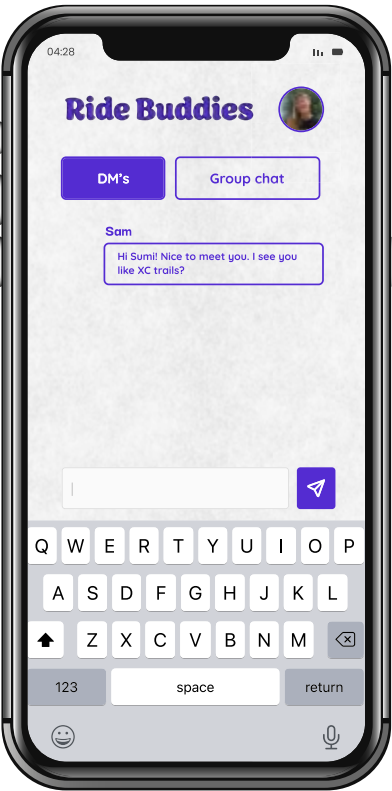


Figure 48

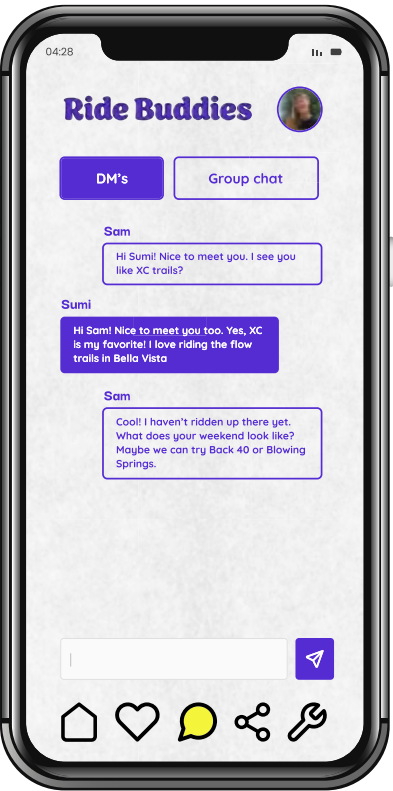


Figure 51

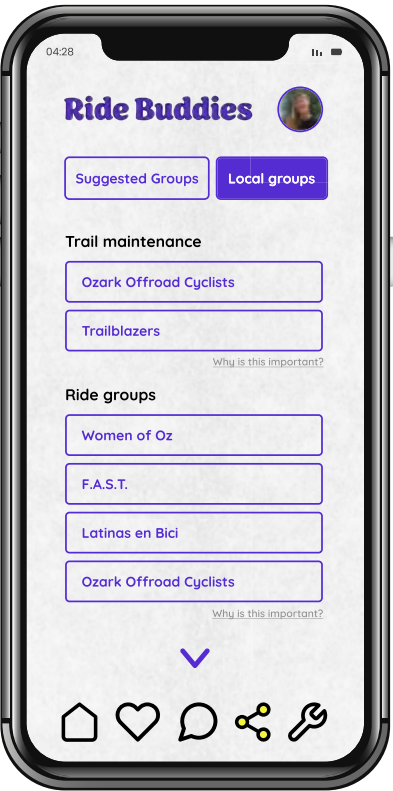


Figure 52

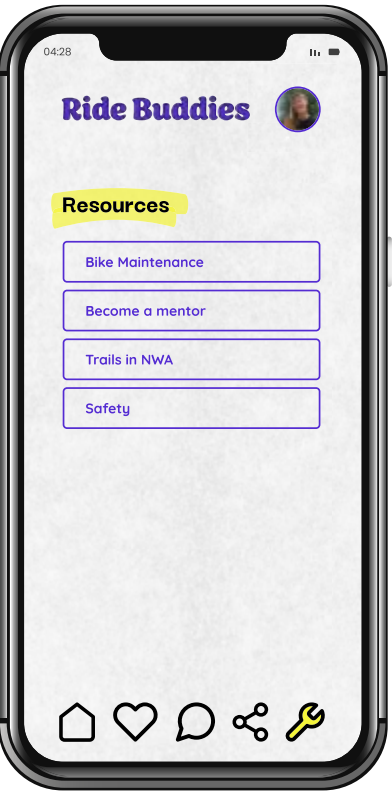


Figure 59

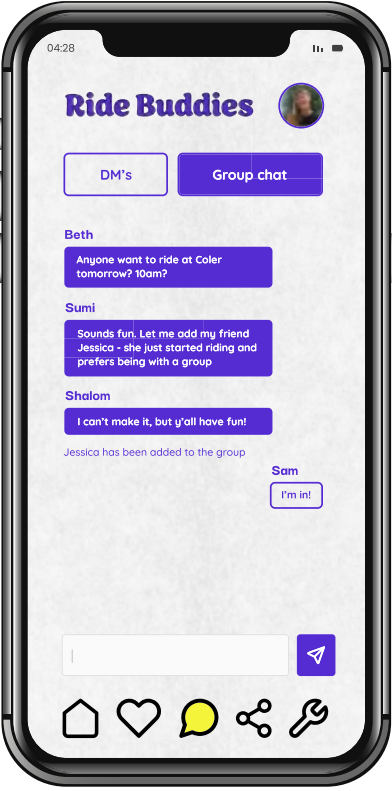


Figure 50

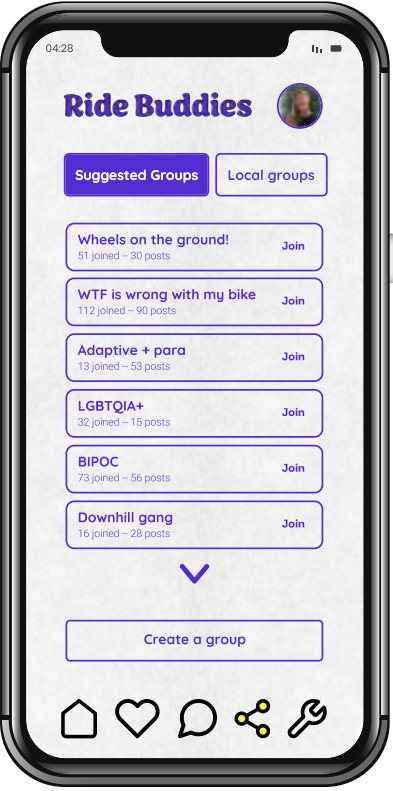
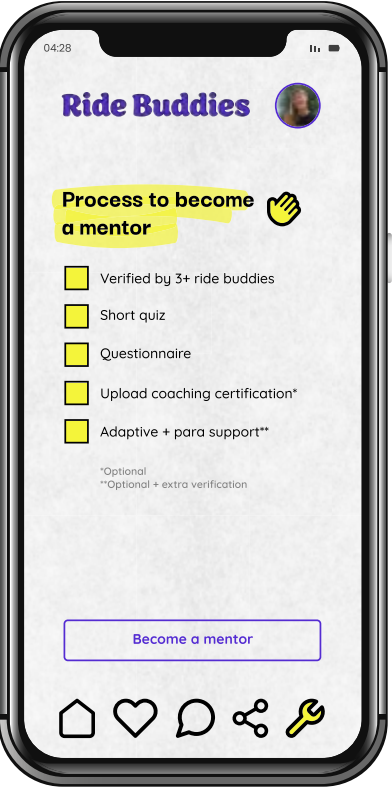


Figure 53



Figure 54



IV.

Possibilities

“Today, **feminist communities of solidarity** take many forms, carving out intentional **physical or digital spaces** of resilience and mutual aid” (Place, 2023, p. 190).

Future Research

This research proposes a feminist community-building framework that could apply to other kinds of community activities besides sports, as seen in Figure X. Combining the multiple levels of community participation from Wenger-Trayner et al. with the moments of belonging theory from Susie Wise, the framework outlines how to navigate a complex community situation in a feminist manner. This research opens up exciting avenues for future research and expansion. The potential for elaboration is vast, with numerous opportunities to delve deeper into the subject matter and broaden the scope of understanding. For starters, here are a few ideas of expansion:

- 1. Facilitating a series of mountain biking workshops where participants could eventually experience all the moments of belonging rather than the first three.
- 2. Using this framework with activities outside of sports and comparing how it applies to other community-based workshops.
- 3. Fully building out the Ride Buddies app.

Adding to the field

This research has added to knowledge regarding women in mountain biking and women in extreme sports, research that has primarily been conducted in the sociology, sports psychology, and kinesiology fields but is still recent and not abundant. Additionally, this project has added to knowledge of qualitative extreme sports data and local Northwest Arkansas research on mountain biking and community formation. Finally, this research introduces a framework for feminist design research on community formation.

Data Gaps

During this research process, I located significant data gaps, which is one reason I am excited to see further studies on this topic.

Sam’s laundry list
of data gaps

- 1. Women in mountain biking.
- 2. Women in extreme sports.
- 3. Knowledge of mountain biking demographics.
- 4. Qualitative data regarding experience in extreme sports.
- 5. Research on non-binary mountain bikers.

Conclusion

My interest in this research began from a curiosity as to why so many women had told me that mountain biking changed their lives, improved their self-confidence, and even helped them work through trauma. Although I felt that mountain biking was unique, I could not put my finger on why. I first explored this interest during a three-week research project in my first semester of graduate school. At that point, I was purely interested in the barriers to entry for women in mountain biking and the participants primarily discussed how they were treated differently due to their gender. That project set the stage for developing my thesis, but my research process changed course in new, exciting, and surprising directions. Participants brought to light issues such as intersectionality, systems of oppression, and interventions to create a cultural shift. They pointed less to blatant sexism as the issue and instead to the larger systems at play: the childcare burden often placed disproportionately on women, systemic racism, the classism of leisure activities, and the cultural and racial bias of who gets to participate in certain sports. They sought trailside childcare, ways to support families interested in riding together, and a central location of events for women mountain bikers. This research reaffirms that communities know what they need. They are the experts in their lives and have innovative ideas for what kind of systems can support them. This research exemplifies the need for co-participation and co-design in the ethnographic research process. I am thankful for the women who shared their stories with me, the participants who came to learn how to mountain bike, and the community organizations that gave me their advice and encouragement during the process. I am thankful this community is so open and active in redesigning its future. They are ready for change and actively working towards a more equitable future for the sport. I hope I can support them in a small way as more researchers add to this knowledge.

V.

Citations

“Citation is **feminist memory**”
(Ahmed, 2017, p. 15).

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Appendix A

Ride-tracking criteria for systematic observation

1. Who did you ride with? (group, solo, one friend, organization, etc)
2. Describe the ride (location, weather, trails)
3. Who did you see on the trail? (describe perceived genders, demeanor, races, ethnicities, etc)
4. Anything else worth mentioning?
5. Strava data + image(s)

Appendix B

Interview Questions

Individual Interview Questions

1. How did you get into mountain biking?
2. Can you tell me about your mountain biking community?
 - a. Who is in it, and how do you know them? Please describe.
 - b. How do you all communicate?
 - c. What kind of events do you have, i.e., post-ride social, dinners, parties?
3. Why do you mountain bike as opposed to other sports or exercises?
4. Can you please talk about how you feel you belong to the mountain biking community?
5. What emotions do you feel during and after mountain biking?
6. Were there barriers to you starting mountain biking?
 - a. Are there barriers now?
7. In your opinion, how do we make mountain biking more accessible for women?
8. How easy is it for you to get on the trails?
9. Lastly, could you please spend 10 minutes filling out this emotional journey map?⁷

⁷ I removed this data point since not every participant was able to complete the emotional journey map portion of the interview.

Appendix B

Expert Interview Questions

- 1. Can you each tell me about how you got into mountain biking?
- 2. Can you each tell me about your mountain biking advocacy journey?
- 3. How did you get started in activism and why do you continue this work?
- 4. What are your thoughts on the role community plays in mountain biking?
- 5. What are the main barriers to mountain biking for women and non-binary people?
- 6. If you could develop a system to lower barriers for women mountain bikers, how would it look?

Appendix C

Survey Questions

Survey questions for women interested in mountain biking

- 1. Why are you interested in mountain biking? (Check all that apply)
 - a. Looks fun
 - b. My friends ride
 - c. I have heard about the great trails here in NWA
 - d. I have seen videos of people riding on social media
 - e. I want to start a new sport
 - f. I want to exercise outside more
 - g. Fill in the blank
- 2. What is currently keeping you from starting mountain biking? (Check all that apply)
 - a. I do not know what gear I need
 - b. I do not have a mountain bike
 - c. I do not have the money for the equipment
 - d. I do not know the technique
 - e. I do not know which trails are for beginners
 - f. I do not have anyone to teach me how to mountain bike
 - g. I feel intimidated by the community
 - h. I feel intimidated by the trails
 - i. I do not think I am in shape enough to mountain bike
 - j. I feel like mountain biking is for men

Appendix C

- k. None of my friends mountain bike
- l. Fill in the blank
- 3. What is your gender identity?
 - a. Woman
 - b. Non-Binary
 - c. Fill in the Blank
- 4. If a system were in place to help you start mountain biking, what would it look like?
- 5. If there were a group lesson for beginning mountain bikers, how would you want it to look?
- 6. Would you like to be contacted about any future programming or events related to this research? If so, please provide an email address you can be contacted at.

Survey questions
for current women
mountain bikers

- 1. How often do you ride?
 - a. A few times a year
 - b. Once a month
 - c. 1-2 times a week
 - d. 3+ times a week
- 2. Who do you typically ride with? (Check all that apply)
 - a. A group of women
 - b. A group of non-binary riders
 - c. A group of men
 - d. A co-ed group
 - e. A partner/ spouse
 - f. One friend
 - g. Fill in the blank
- 3. What race/ ethnicity do you identify with? (Check all that apply)
 - a. White or Caucasian
 - b. Black or African-American
 - c. Latinx/Latino/Latina or Hispanic
 - d. Asian American or Pacific Islander
 - e. Native American/ Indigenous American
 - f. North African
 - g. Southwest Asian
 - h. Indian
 - i. Fill in the blank

- 4. What is your gender identity?
 - a. Woman
 - b. Non-Binary
 - c. Fill in the blank
- 5. What age group are you in?
 - a. 18-29
 - b. 30-39
 - c. 40-49
 - d. 50-64
 - e. 65+
- 6. What is your socioeconomic status?
 - a. Low income
 - b. Middle class
 - c. Upper class
- 7. At what age did you start mountain biking?
 - a. Under 10
 - b. 11-14
 - c. 15-17
 - d. 18-25
 - e. 26-36
 - f. 37-47
 - g. 48+
- 8. How did you get into mountain biking?
 - a. Partner/ spouse introduced me
 - b. A family member introduced me
 - c. My friend introduced me
 - d. I taught myself
 - e. Fill in the blank

- 9. Why do you mountain bike? (Check all that apply)
 - a. For the outdoors
 - b. For the exercise
 - c. For my mental well-being
 - d. For the fun
 - e. For the adrenaline rush
 - f. For the social aspect/ community
 - g. For the challenge
 - h. Fill in the blank
- 10. What benefits (if any) do you get from mountain biking? (Check all that apply)
 - a. Makes me feel empowered
 - b. Provides me with a community
 - c. Keeps me in shape
 - d. Lowers my stress
 - e. Raises my mood
 - f. Helps my mental well-being
 - g. None
 - h. Fill in the blank
- 11. Describe the mountain biking community.
- 12. Do you socialize with your ride group or friend(s) off the trail? If so, please describe.
- 13. Are there any barriers keeping you from mountain biking?
- 14. What would you propose to engage more women in mountain biking?
- 15. If there was a system to help you when you started mountain biking, what would that have looked like?

- 16. Would you be willing to participate in an in-person or online interview for this research? If so, please provide an email address you can be contacted at.
- 17. Would you like to be contacted about any future programming or events related to this research? If so, please provide an email address you can be contacted at.

Appendix D

Research marketing materials

Survey Flyer Verbiage

Title: Are you a mountain biker or interested in becoming one?
Sub-header: Do you identify as a woman?

I am interested in the mountain biking experience of self-identified women in Northwest Arkansas as a part of my graduate thesis at the University of Arkansas.

Please scan the QR code below to learn more about this project and complete a survey. There are currently two ways to get involved: A survey and/or interview.

Participants must be:
Over the age of 18
Currently mountain bike or interested in starting
Identify as a woman
Live in Northwest Arkansas

Questions? Please contact Samantha Wischmeyer at sgw017@uark.edu

Instagram Story Verbiage

Main text: Are you a mountain biker or interested in becoming one?
Subtext: Do you identify as a woman?

I am interested in the mountain biking experience of self-identified women in Northwest Arkansas as a part of my graduate thesis at the University of Arkansas.

Participants must be:
Over the age of 18
Currently mountain bike or are interested in starting
Identify as a woman
Live in Northwest Arkansas
Click here for more information + to get involved!

Facebook Post Verbiage

Are you a mountain biker or interested in becoming one? Do you identify as a woman? Join my research study!

I am interested in the mountain biking experience of self-identified women in Northwest Arkansas as a part of my graduate thesis at the University of Arkansas. I am looking for participants who fit the following demographic:

- 18+
- Currently mountain biking or are interested in starting
- Identify as a woman
- Live in Northwest Arkansas

If you or anyone you know fits this demographic, please follow this link for more information and to get involved. Please share this with your friends! There are currently two ways to get involved: A survey and/or interview.

Feel free to message me with any questions regarding this research project. Thank you so much!

Email/Text/or
DM to Potential
Respondents for the
Expert Interview
(who live in NWA)

Hello _____,
My name is Samantha Wischmeyer, and I am a graduate student at the University of Arkansas in the Communication Design program researching self-identified women mountain bikers in Northwest Arkansas. I am studying the role that community plays in lowering barriers and fostering empowerment among women mountain bike communities. I have reached out to you specifically because you are an expert in this, and I would love to hear your insight.

I am wondering if you would be willing to participate in a group interview with other women mountain bike experts in the area or an individual interview in person or via Zoom. The group interview would take 1 hour and 15 minutes and the individual interview would take 30-45 minutes. Additionally, you can participate in this research by taking this survey.

Participation is voluntary, and you are welcome to reach out to me with any questions you may have about this research. Please let me know if you are interested in participating by responding to this email.

Thank you so much for your time,
Samantha

Email/Text/ or
DM to Potential
Respondents for the
Expert Interview
(out of area)

Hello _____,
My name is Samantha Wischmeyer, and I am a graduate student at the University of Arkansas in the Communication Design program researching self-identified women mountain bikers in Northwest Arkansas. I am studying the role that community plays in lowering barriers and fostering empowerment among women mountain bike communities. I have reached out to you specifically because you are an expert in this field, and I would love to hear your insight on this matter.

I wonder if you would be willing to participate in an individual interview via Zoom which would take 30-45 minutes. Participation is voluntary, and you are welcome to reach out to me with any questions you may have about this research. Please let me know if you are interested in participating by responding to this email.

Thank you so much for your time,
Samantha

Hello _____,
My name is Samantha Wischmeyer, and I am a graduate student at the University of Arkansas in the Communication Design program researching self-identified women mountain bikers in Northwest Arkansas. I am studying the role that community plays in lowering barriers and fostering empowerment among women mountain bike communities. I have reached out to you specifically because you are a current mountain biker in Northwest Arkansas, identify as a woman, and are over 18. I would love to hear your insight on this matter. I wonder if you would be willing to participate in this research by taking this survey (link) and/or participating in an individual interview in person or via Zoom, which would take 30-45 minutes.

Participation is voluntary, and you are welcome to reach out to me with any questions you may have about this research.

Email/Text/ or DM to
Potential Respondents
for a Survey or
Individual Interview

Please let me know if you are interested in participating by responding to this email.

Thank you so much for your time,
Samantha

Appendix E

Mountain biking workshop itinerary

12:30-12:45pm	Sam, Bea, and Lynette arrive
1-1:30pm	Participants arrive and consent forms are handed out. Participants are fitted for bikes and safety gear is distributed.
1:30-1:45pm	Introductions – Stand in a circle and have the participants and instructors go around and share their names, pronouns (if they feel comfortable), their favorite food, and what they hope to get out of the class.
1:45pm-2:30pm	Go outside to a grassy section. Lynette and Bea discuss the proper use of safety gear, parts of the bike, ABC's, trail etiquette, and proper riding form. Practice their riding form in the grass in a circle (ready position, level pedals, scanning ahead, touch on cornering, etc). Lynette recommended the gardens behind the track.
2:30pm-3:15pm	Instructors lead the group on a trail to practice (one leader and one sweep in the back). Sam will follow the sweep. Lynette recommended Tsa La Gi bike park.
3:15pm-3:30pm	Return bikes to UREC, thank participants, and ask them to fill out the post-ride survey. Encourage them to share numbers to go riding.

Appendix F

Post-Ride Survey Results

Figure 55
Rider satisfaction

Overall, how satisfied were you with this group ride?

5 responses

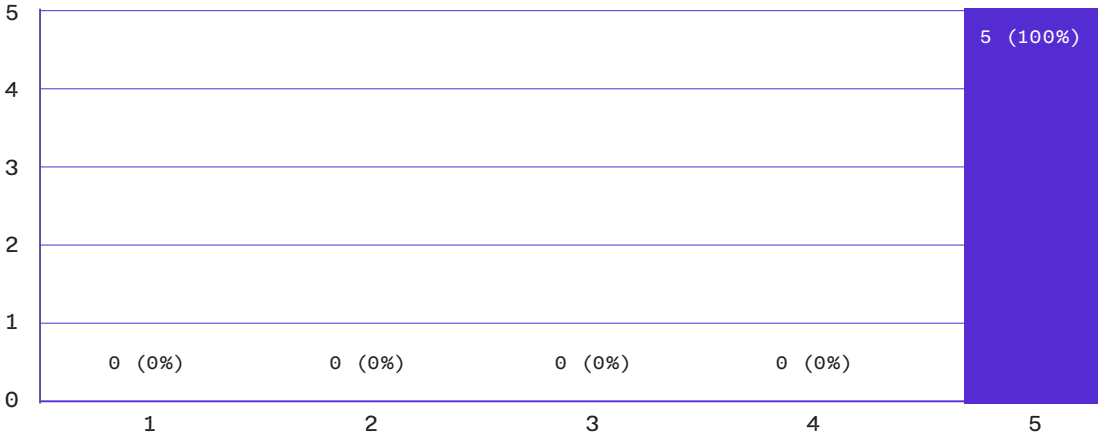


Figure 56
Rider comfort

I felt supported and comfortable during this group ride.

5 responses

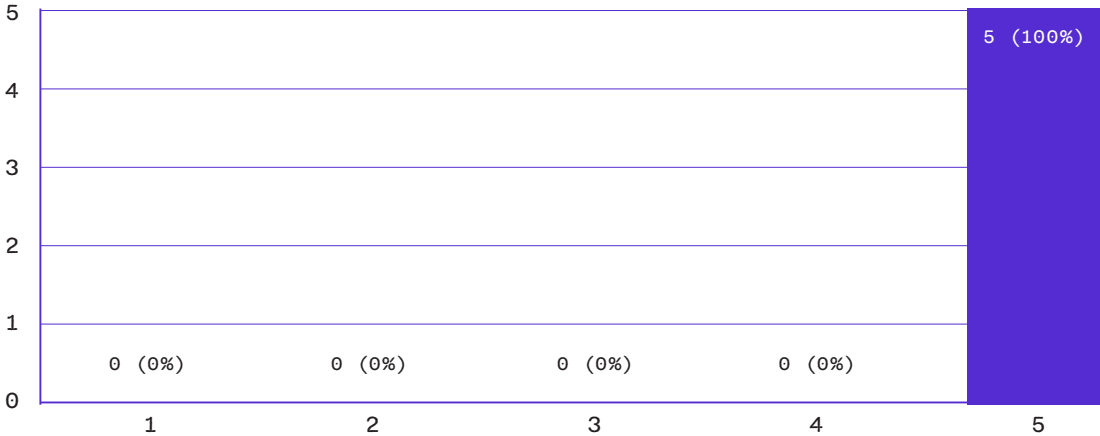


Figure 57
Rider confidence

Riding with this group boosted my confidence in mountain biking.

5 responses

